The Iron Age
A CHILTON PUBLICATION
THE NATIONAL METALWORKING WEEKLY
April 5, 1951

TIMKEN® roll neck bearings lower mill operating costs these 8 ways:

1. ELIMINATION OF COMPLICATED LUBRICATING SYSTEMS that hamper roll changing. No pipes, tubes, etc. Timken® bearings permit use of simple, economical grease lubrication. Rolls can be changed easier and in less time.

2. MORE TONNAGE PER BEARING. Records indicate that Timken bearings have greater tonnage life expectancy. Made of Timken fine alloy steel, the rolls and races have carburized, wear-resistant surfaces and tough, shock-resisting cores.

3. GREATER MILL RIGIDITY. Balanced proportion design of Timken bearings permits larger diameter roll necks than ever before possible with tapered roller bearings. Average roll neck size is 71% of the O.D. of the bearing. Roll neck strength increased 50 to 60%.

4. HIGHER ROLLING MILL SPEEDS are possible because Timken bearings minimize friction.

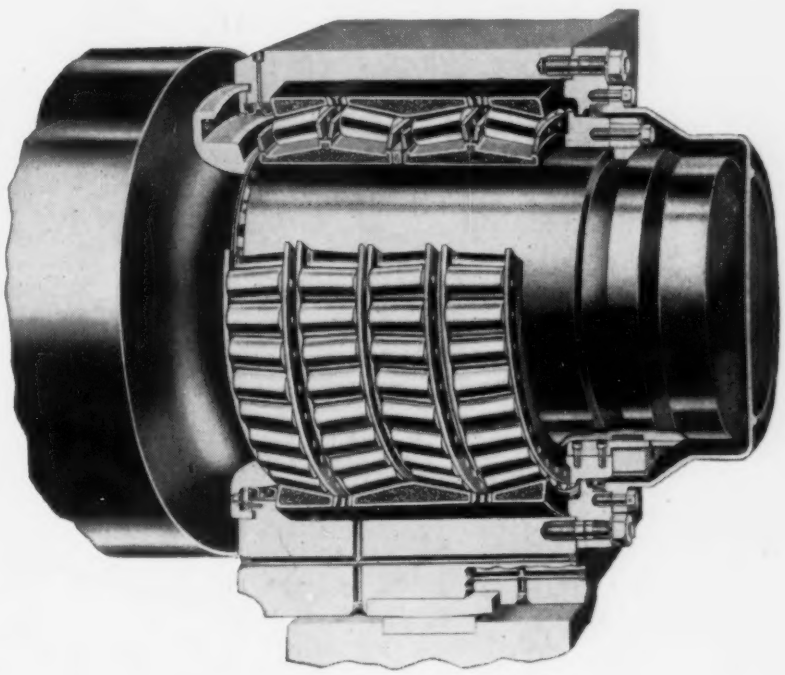
5. MILLS CAN BE STOPPED AND RESTARTED WITH NO LOSS OF STEEL. Timken bearings permit mills to start smoothly and easily under full load. Gauge setting is not disturbed.

6. NO SPECIAL THRUST BEARINGS NEEDED. Timken tapered roller bearings take both radial and thrust loads in any combination.

7. LOAD RATINGS INCREASED UP TO 40% due to balanced proportion design.

8. PROLONGED ROLL LIFE is assured because Timken bearings provide maximum rigidity, eliminate roll neck wear.

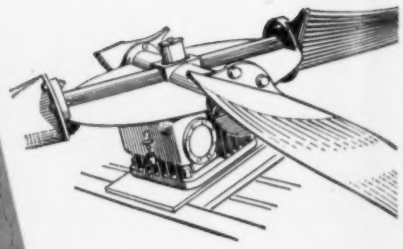
You can be sure of all these advantages in either existing or new equipment by specifying balanced proportion Timken bearings for back-up and work rolls. Consult our roll neck bearing specialists for full details. Write The Timken Roller Bearing Company, Canton 6, Ohio. Canadian plant: St. Thomas, Ont. Cable address: "TIMROSCO".



TIMKEN TAPERED ROLLER BEARINGS

TRADE-MARK REG. U. S. PAT. OFF.

NOT JUST A BALL ○ NOT JUST A ROLLER ⬭ THE TIMKEN TAPERED ROLLER ⬭ BEARING TAKES RADIAL ⊕ AND THRUST →⊕← LOADS OR ANY COMBINATION →✳←



Cleveland Cooling Tower Drives (built in sizes 50 CU to 500 CU inclusive) are rated under Class 2 service conditions, except that thermal limitation does not apply. Heavy, externally ribbed housing effectively dissipates heat to air stream.

Cleveland Type CU . . . ideal drive for cooling towers

This worm gear drive is designed specifically for cooling tower service. It meets a long-felt need for a compact, heavy duty speed reducer that will operate continuously, at high speeds and for long periods. It is inherently quiet in operation. Extreme conditions of heat and humidity do not affect it. It carries high thrust loads and high radial loads without loss of efficiency. It lends itself to rugged mounting, and due to the simplicity of its design, it is easily installed, serviced and adjusted in the field.

Every CU drive is run in and pretested under load before it leaves the factory. Thousands of units now in use prove its reliability in all classes of service—in the oil fields, in industry, in air conditioning systems in commercial and public buildings—in short, wherever there's a cooling tower, you can depend on CU.

Write for Bulletin 135 for full description of Type CU. Ask also for free literature on other Cleveland units. The Cleveland Worm & Gear Co., 3252 East 80th Street, Cleveland 4, Ohio.

Affiliate: The Farval Corporation, Centralized Systems of Lubrication. In Canada: Peacock Brothers Limited.

CLEVELAND
Worm Gear
Speed Reducers

E. Engin
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They're specially designed to do a better job

Whenever you use a specially designed unit fastener, rather than a standard item or a fabricated fastener consisting of many parts, you can be sure of better all-around performance. For special design and special manufacture place unit fasteners in a class by themselves—head and shoulders above other fastener items.

At our Lebanon, Pa., fastener plant, we specialize in producing unit fasteners. Besides having complete facilities for manufacturing Specials, as we call them, we have a staff of engineers who, through long experience in the fastener field, are often able to come up with ideas which offer the customer improved performance, fewer parts, and greater economy of manufacture.

In addition to producing Specials, Lebanon Plant also turns out a complete range of standard items, such as machine, carriage and lag bolts, nuts, spikes, and rivets.

BETHLEHEM STEEL COMPANY
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On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. *Export Distributor:* Bethlehem Steel Export Corporation

BETHLEHEM STEEL

Bethlehem supplies every type of Fastener

IRON AGE

CONTENTS

THE IRON AGE

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IRON AGE *summary*

iron and steel industry trends

Inventory fear grows in consumer durable lines . . . Credit causing most worry . . . MRO seen victim of its own excesses . . . Metalworking activity high.

Inventory Trouble—Whispers of inventory trouble, barely audible a few days ago, have risen to a steady murmur this week. Biggest trouble spot in the metalworking field is in consumer durable goods. Bulging inventories of television, radios, appliances and hardware has been noted for several weeks. Early hints of an inventory recession were based on fear of what might happen as a result of overextended credit.

Credit Causes Worry—For a long time it has been known that dealers and distributors were buying goods faster than they were selling them. They were insuring themselves against shortages expected later this year. Many of them borrowed money to do this, now they find their shelves are loaded while manufacturers are still turning out a torrent of goods.

Defense Spending Boost—It is true that consumer buying in recent weeks has been disappointing to some. But it is still at a pretty good level. It is expected to improve in the months ahead—spurred by defense spending now at the rate of $5.5 billion per month. This defense spending is bound to be reflected at the consumer level; it may help consumer demand catch its second wind. Meanwhile, those who have built large inventories of consumer goods on credit are holding their breaths.

Still Want Metal—Inventory fear in some consumer lines is not reflected by any slackening of demand for basic materials such as steel and nonferrous metals. Consumer pressure for more is still intense. Even manufacturers making products reported to be overstocked have shown no inclination to turn down their quotas of scarce metal.

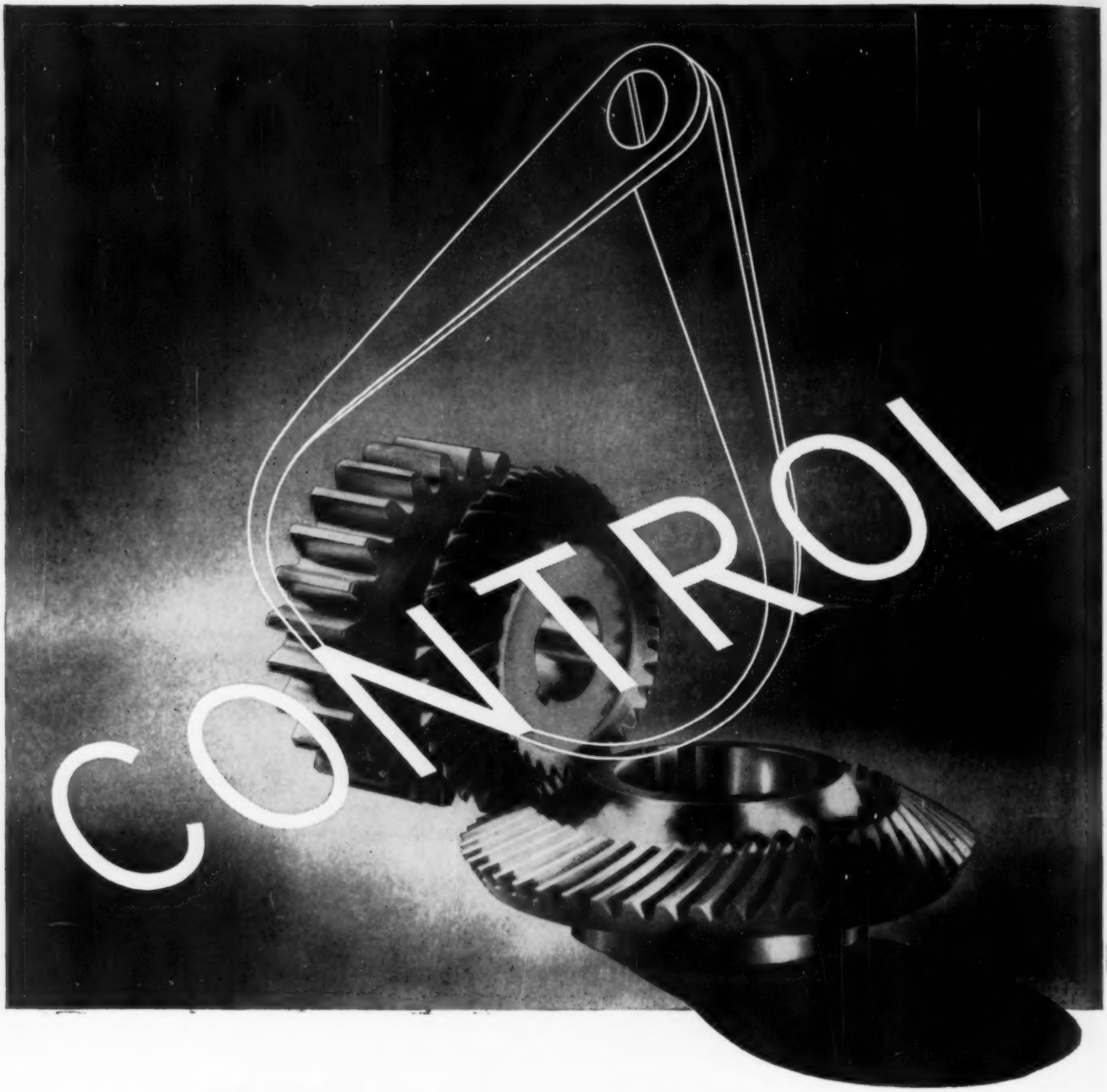
Dead from Excesses—The controversial DO-97 priority for maintenance, repair and operations is now practically inoperative as applied to steel—a victim of its own excesses. National Production Authority has advised steel producers to refer DO-97 orders calling for excessive tonnages to the Iron and Steel Div. of NPA. Several mills already groaning under the weight of these orders have indicated they are doing just that.

Strange Orders—Steel people consider NPA's action a stopgap to extricate itself from an impossible situation pending draft of a new MRO order. DO-97 had come to be something of a Frankenstein. Some of these orders were remarkably strange, to put it mildly. One mill received an order for 1500 tons of nails; another was shocked when asked to take an order for hot-rolled sheets equal to the recent increase in the DO set aside (from 17 to 25 pct).

DO's Brighten Picture—A careful check of steel consumers indicates that they are generally not being hit as hard by the defense program as some people believe, after reading about the amount of steel needed for defense. It is true that regular steel quotas of many consumers have been slashed more than half. But most of these consumers have been able to obtain some defense or essential civilian work. Regular mill quotas of these users are augmented by DO tonnage. Some firms naturally are better fitted for DO or essential work than others. Some saw the handwriting on the wall and got an early start in their pursuit of priority business.

Shares Aren't Equal—Overall employment figures and steel production and shipment data show that metalworking activity is still at a very high level. Although they don't reflect the uncertainty facing many manufacturers, this does not mean that some firms are not suffering real hardship. But no one has yet figured out a plan to share the transition from guns to butter equally.

See "Can You Make It?"—new Iron Age subcontracting service on p. 123



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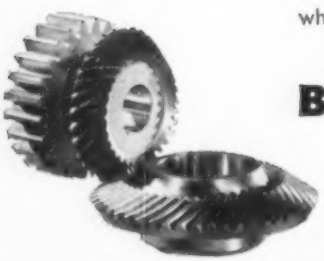

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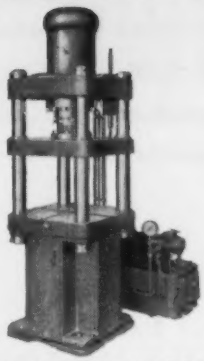

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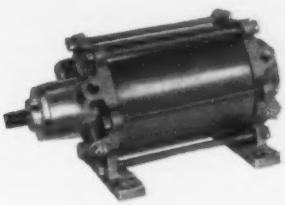

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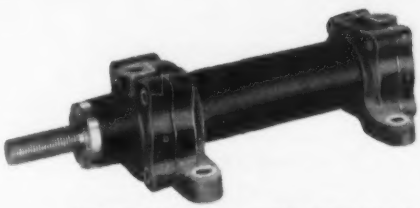

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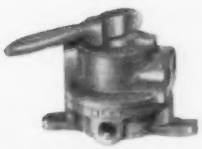

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- ☐ "Hannifin Hydraulic Cylinders", Bulletin 110.
- ☐ "Air Control Valves", Bulletins 57-W, 230, 236, 240, 241.
- ☐ "Hannifin Air Cylinders", Bulletin 210.
- ☐ "Air Operated Presses", Bulletins 250, 251, 252.
- ☐ "Hannifin Air Vises", Bulletin 280.
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FREE *publications*

These publications describe money-saving equipment and services . . . they are free with no obligation . . . just fill in and mail the postcard on the opposite page.

Steelmaking Equipment

Wellman steelmaking products, supplied both in Great Britain and overseas, is illustrated and described in an unusually complete 236-p. brochure showing special furnace plant and mechanical equipment for the production of steel from the melting shop to the finishing stages. Illustrations in the book indicate the general nature of this company's activities, and the range of products from the smallest units to the construction of a complete plant, including large openhearths and metal mixers. Also covered are special materials handling equipment, cranes, coke oven machinery, seamless tube manufacturing plant and sheet mill equipment. Modernization as well as new construction in all parts of the world are dealt with. *Wellman Smith Owen Engineering Corp., Ltd.*

For free copy insert No. 1 on postcard.

Investment Casting Data

General, technical and design data for precision investment castings is available to engineers, designers and others interested, in a new 6-p. illustrated folder covering costs, tooling, both small and large quantity production, how complex shapes can be handled, size limitations, finish and tolerances. One section is devoted to the physical properties of investment castings and another to basic designing information. *Hitchiner Mfg. Co., Inc.*

For free copy insert No. 2 on postcard.

Reduced Handling Costs

A new 4-p. certified job study shows how an auto parts manufacturer saved 160-man hr per week in handling and transporting materials within the plant. Also detailed are methods which reduced loading costs 75 pct, and tripled warehouse capacity with 12-ft stacking of heavy loads of steel and parts. Elimination of many costly employee injuries from heavy lifting is another advantage to the methods described, where 9000-lb loads of yoke steel are transported from storage to forge, a distance of 900 ft in 10 min. *Towmotor Corp.*

For free copy insert No. 3 on postcard.

Versatile Machine

The Webb Steelworker, a combination shear, punch and coper for either job-lots or high production work, is described in a new 4-p. folder listing capacity and specifications. The bulletin tells how five complete tools are incorporated in this single unit: A punch for plate, bars or structurals; cuts angles and tees with straight or minor cut; cuts off round and square bars; shears plates and bars; and has a coping or notching attachment. *Webb Corp.*

For free copy insert No. 4 on postcard.

Aircraft Steels Booklet

A new 68-p. booklet on aircraft steels includes a condensed listing of the essential features of the new Military (MIL) Aeronautical Specifications. The booklet contains a digest of many of the Air Force-Navy (AN), Federal (QQ) and Aeronautical Material Specifications (AMS) pertaining to steel, plus the nearest corresponding AISI analyses. Also shown are the wide range of sizes and analyses of aircraft steels that are available for shipment from stock. *Joseph T. Ryerson & Son, Inc.*

For free copy insert No. 5 on postcard.

Stitching Machines

"Profit by Stitching" is the title of a new 12-p. booklet describing Acme SilverStitchers, the speedy and efficient machines for closing shipping cartons. Advantages of this method of forming stitches from continuous-length coils of wire and then driving and clinching the stitches in solid fibre and corrugated cartons are outlined. Various models of arm, post and dual-type machines are shown, and complete specifications are listed. *Stitching Wire Div., Acme Steel Co.*

For free copy insert No. 6 on postcard.

Resurfaces Floors

Stonhard Stonpach, developed to meet the demands of many industries where floors are subject to the disintegrating effects of acid, grease, oil, excess water and abrasive wear, is covered in a new 4-p. folder detailing advantages of this and other economical building repair materials. Numerous installations are illustrated to show the varied uses for this floor patching and resurfacing material. *Stonhard Co.*

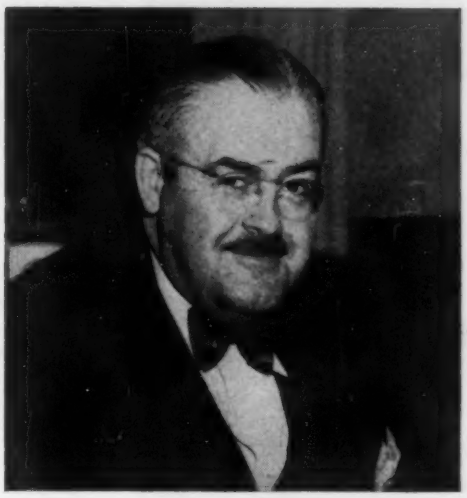
For free copy insert No. 7 on postcard.

Testing Machines

A new Super "L" line of hydraulic testing machines for tension, compression, transverse and flexure testing is described in a new 8-p. bulletin showing units available with 3 ranges in capacities. Detailed descriptions cover the unique electronic Selectorange indicating system, which provides a 50 to 1 speed of testing ranges on one 28-in. dial; ability to change from any of the three ranges to another during test without changing rate

Turn to Page 134

IRON AGE *salutes*



William J. Sampson, Jr.

BILL SAMPSON is a king-sized example of how a busy executive can direct the activities of an expanding company and still have time and energy left to make important contributions to civic and business organizations in his community.

If we were to list all his achievements there would be no space left to tell you what a nice guy he is to know. So we'll hold it down.

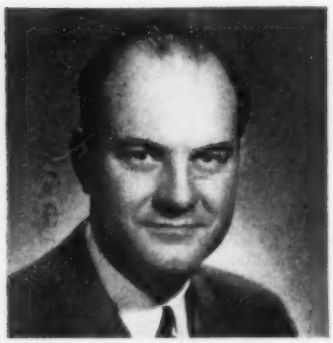
He was born of a Youngstown steel family, attended Yale, served in World War I, and held positions with Elyria Iron & Steel, Steel & Tubes, Inc. (president), and Republic Steel (vice-president, sales). During the last war he became president of American Welding & Mfg. Co. This medium-sized welding and fabricating firm soon became the largest maker of tank turret rings in the country.

War's end found him looking for new products and new customers. Don't let us tell you how well he succeeded; gross sales last year were almost five times the best prewar year of this 33-year old company.

How did he do it? Not by sitting on his hands and hoping. He instituted professional surveys. He traveled, he talked, and he sold. If he couldn't sell a product, he sold himself and his company. Also, he will be the first to tell you he surrounded himself with the right men—and treated them right.

Everybody likes Bill Sampson. In civic affairs this genial 300-pounder is affectionately known as "the one-man gang." That's because his energy matches his size. He has an uncanny way of getting results, too. He can walk a tight rope as if it were a broad avenue. And he keeps on smiling.

EDWIN H. GOTT, named general superintendent of the Youngstown district operations of U. S. Steel Co., Youngstown, Ohio.



WALTON B. SOMMER, appointed as assistant to the president of Keystone Steel & Wire Co., Peoria, Ill.

JOHN D. JONES, appointed chief operations engineer of Brainard Steel Co., Warren, Ohio.

JOHN H. TACKE, appointed operations manager at Kaiser-Frazer Corp., Willow Run, Mich.

IRON AGE *introduces*

Continued

Arlie F. Johnson, placed in charge of all defense output; **David J. Dunlop** will head automotive production; **G. Robert Scharf** named superintendent of the army rocket project along with **Paul Tabor. Roland Satterlee** named superintendent of transmission production for the amphibious cargo carrier, and **Jesse C. Hunter** superintendent of assembly of the vehicle for PONTIAC MOTOR DIVISION, Pontiac, Mich.

Dell M. Ramsey, elected a vice-president and works manager, Tonawanda plant of EXOLON CO., and **Samuel F. Walton** was elected a vice-president and technical director of the company.

N. C. Rogers, promoted to the new post of assistant industrial relations manager at the PACKARD MOTOR CAR CO., Detroit. **A. E. McLean,** promoted to personnel manager and **J. E. McVittie** has been transferred to personnel, filling Mr. McLean's old position as supervisor of personnel records.

Raymond B. Jewett, appointed industrial sales engineer of the PARKER APPLIANCE CO., Cleveland, to represent the company in Philadelphia. **M. L. Sheehan** joined the company as industrial sales engineer and will be located in Dallas.

James C. Zeder, elected a vice-president of CHRYSLER CORP., Detroit.

H. C. Kellogg, appointed to the executive staff of the vice-president of the aircraft engine, tractor and machined products group of FORD MOTOR CO., Dearborn.

William F. MacDonald, elected president of E. F. HOUGHTON & CO. OF CANADA, LTD., Toronto.

Elmer F. Paul, appointed manager of manufacturing, specialty transformer and ballast divisions, Fort Wayne, Ind., **Donald Poland** replaces Mr. Paul as manager of the Danville, Ill., plant of the GENERAL ELECTRIC CO.

John Banks, appointed works manager in charge of automobile production and **Harvey Smith** as works manager in charge of aircraft manufacturing for the KAISER-FRAZER CORP., Willow Run, Mich.

J. R. Lewis, appointed assistant general sales manager of QUAKER RUBBER CORP., Philadelphia, a division of H. K. Porter Co., Inc.

Harry G. Anderson, appointed district manager at Birmingham for LINK-BELT CO. Mr. Anderson succeeds **J. T. Bell, Jr.,** who has been called back into the service of the U. S. Army, Corps of Engineers.

James M. Quarry, promoted as special assistant to the plate mill superintendent and **Robert C. McMichael** has been promoted to the position of supervisor of the 120-in. mill at LUKENS STEEL CO., Coatesville, Pa.

C. W. Frederick, appointed chief product engineer of CHEVROLET MOTOR DIVISION, at Tonawanda, N. Y.

Bert Woldring, named president and general manager of GOODRICH WELDING EQUIPMENT CORP., Reed City, Mich.

O. A. Redhair, named assistant director of payroll accounting for the WESTINGHOUSE ELECTRIC CORP., Pittsburgh.

OBITUARIES

John W. Humphrey, 53, general superintendent of Youngstown district plants, U. S. Steel Co.

Harold O. Shepard, for many years sales engineer with United Engineering & Foundry Co., Pitsburgh.

Leslie E. Sebald, vice-president-engineering of the Griscom-Russell Co., New York.

Arthur R. Schulze, 67, former chief engineer of U. S. Steel Co. in the Youngstown district.

S. Perry Howze, until his retirement a few years ago, sales manager for Harbison-Walker Refractories Co., in New York.

J. A. Voland, president of Golden-Anderson Valve Specialty Co., Pittsburgh, at his home in West View, Pa.

D. C. Ball, founder and chairman of the board of directors of Oakite Products, Inc., at his home in Lake Placid, N. Y., at the age of 93.

on the assembly line

automotive news and opinions

Detroit buzzes with CMP speculation . . . World War II groundwork for meeting problems is solid.

by Walter G. Patton

Ferguson vs. Ford — After 3 years of skirmishing, attempted settlements and charges hurled by both sides, Harry Ferguson's suit against the Ford Motor Co. for approximately $3.5 million was brought to trial in Federal court in New York City last week. It is said to be the largest civil suit ever brought in the country.

He charged Ford with alleged patent infringements on his tractor developments and with attempting to destroy his own setup for tractor production and distribution. Previous attempts at a settlement were made by Ford in October 1949 but were turned down by Ferguson as unacceptable. Ford claimed at the time that Ferguson's suit was fantastic.

Buzzing on CMP — Detroit is buzzing with speculation these days as to how the automotive industry will function as national defense demands an ever-increasing proportion of its facilities. Speculation has been given further impetus lately by expressions of concern about ways and means for handling all the problems that would beset motor vehicle manufacturers and their innumerable suppliers if a Controlled Materials Plan is put into effect.

In the previous national emergency, the industry created special organizations to handle the many problems that confronted competitive automotive companies. They were drawn into cooperative networks to serve a single customer, the U. S. Government.

Automotive Committee—In the fall of 1940, the automotive committee for air defense was organized to enable motor vehicle, body, parts and tool and die manufacturers to undertake a cooperative program of assistance to the aircraft industry.

Disbanded in 1941 after its purposes had been accomplished, it provided the pattern for the Automotive Council for War Production which the industry formed immediately after Pearl Harbor.

Teamwork—Within this framework the nation's most competitive industry speedily transformed itself into a voluntarily cooperative team. Early in the war, it set up machinery listing and tooling information services of inestimable value to thousands of contractors and subcontractors.

Its war products divisions brought together committees of experts working together throughout the war, on airframes, aircraft engines, guns, shells, tanks, combat vehicles, etc. Similar teams of specialists worked on solution of traffic problems, cooperative salvage programs and methods for utilizing manpower.

Others Follow — So effective were its methods that the pattern of voluntary cooperation was adopted by the aircraft industry, among others, and was later the subject of study by a group of British industrialists, acting under instructions from the British Service of Supply.

An impressive list of the industry's production for World War II was assembled as an appendix in "Freedom's Arsenal," the official history of the Council, which was published after the war. As a result of the present emergency, the book has recently acquired new significance for those who speculate about the methods that may be required to enable the industry to perform as effectively in the present emergency as it did in the previous one.

Heavy on Defense—Some machine tool makers in the area report that defense orders are accounting for almost 90 pct of present backlogs. Nearly all of this tooling ordered for defense projects is of the standard type. This will permit more fluid engineering of tanks and if design changes become necessary present tooling can still be used. It also provides for greater flexibility in manufacturing.

The Fifth Tire—Failure of synthetic rubber manufacturers to maintain sufficient production to offset government stockpiling of natural rubber is reported by sources in the tire industry to be the reason why spare tires were

assembly line

Continued

eliminated as new equipment by most of the automobile companies last week.

By the end of the week, The Big Three, Nash and Studebaker had eliminated the fifth tire. Willys-Overland and Packard were considering the same move while Hudson for the present intended to continue it as original equipment.

Record in the Making—Indications are that new passenger car registrations during February will hit an all-time high in the automotive industry's history for that month. They will total approximately 435,000 units, according to R. L. Polk & Co., Detroit, statisticians for the automotive industry. However, they will be down some 35,000 from January registrations. New truck registrations for the month are expected to total approximately 83,000 units.

Ford Tank Plant—As had been previously expected, Ford Motor Co. will build a new tank plant containing an area of more than 1.5 million sq ft on a 157-acre tract in Livonia, Mich., which was purchased recently. Property is located on Plymouth Road about 3 miles west of Middlebelt Road.

This follows a recent announcement that Ford had received an Army order for medium tanks valued at $195 million. To date the company's defense contracts total nearly a billion dollars.

Temporary Decline — Although new and used car dealers are undergoing a slight decline in sales at the present time, the softening of the market is not expected to be of long duration. Factors contributing to the decline in sales are said to be only temporary and due to the lack of favorable weather, payment of income taxes and the recent buying for Easter holidays.

New car inventories remain about 10 to 15 pct below last year at this time. Used car stocks, however, are above average. Low-priced used cars are moving fairly well while sales of higher priced cars are reported slowing up.

More Contracts — Government contracts in the area continue to spiral as the defense program moves ahead. Among recent government awards are included two contracts totaling $57,500,000 to the Pontiac Div. of GM. Both will be handled at the Pontiac plant. One contract amounting to $12.5 million is for Army rockets while the remaining $45 million will go for the construction of a new type of amphibious cargo carrier for the Army.

Chevrolet has recently announced receipt of a contract by the St. Louis Ordnance District calling for more than $25 million worth of artillery ammunition. In addition, Buick has started construction of a large one-story plant at Flint for the production of the Wright J-65 Sapphire jet engine. They will do the major part of the manufacturing at Flint but assembly will be done at another as yet unselected site.

Rebuilding Tires—Should tire rationing be imposed in the near future motorists are expected to find some relief through a new electronic process for rebuilding automobile and truck tires developed by Fisk Tires Div. of U. S. Rubber Co.

According to D. T. Hoffman, Fisk's Detroit district sales manager, tires rebuilt by this process are claimed to equal new ones in wear and mileage and will cost one-third less. Called "Truvanizing," the process is under license to Allied Rubber Products, a Detroit company, and is being made available to motorists for the first time.

Watering the Work Force—In an attempt to ward off an impending critical shortage of tool shop labor, employers are trying to get unions to go along with the idea of diluting present skilled labor forces with semi - skilled workers. Although difficulties are expected to be worked out, the question of seniority will be one of the prime considerations.

Some quarters claim semi-skilled workers trained during the defense emergency will later displace more experienced workers when and if the situation eases off.

THE BULL OF THE WOODS — By J. R. Williams

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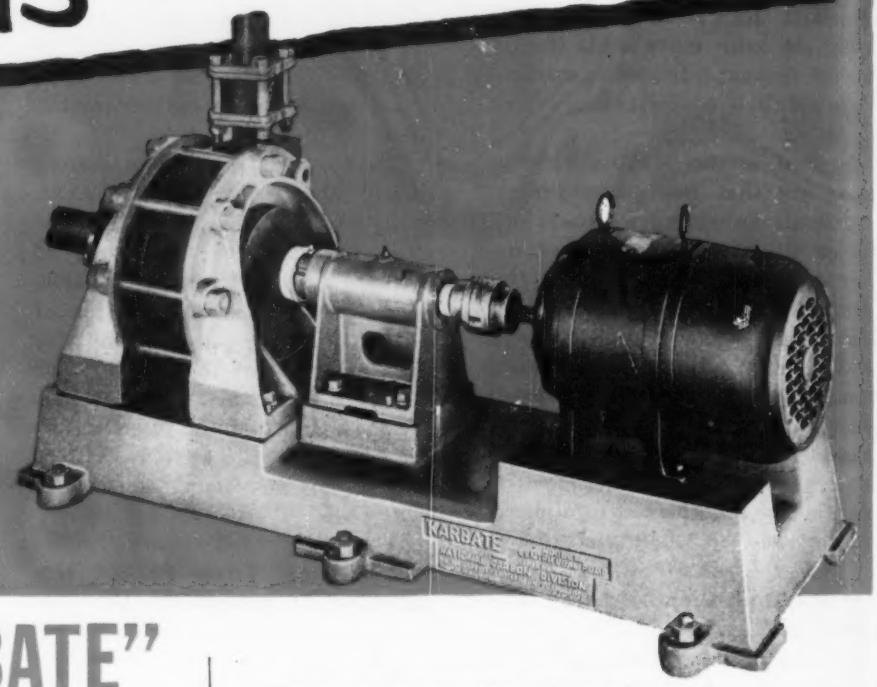

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west coast progress report

digest of far west industrial activity

by R.T.Reinhardt

Foundry Fuel Progress—Two Portland, Ore., foundries have successfully experimented with the carbon fuel briquets developed by the U. S. Bureau of Mines at Albany, Ore., and the Portland Gas & Coke Co. (See THE IRON AGE, Mar. 8, 1951, p. 77.)

This fuel, made for domestic use, promises to relieve the tight coke situation, contains about 12 to 15 pct volatile matter which is removed by calcining for use in cupolas. The fuel is reported capable of withstanding normal burdens in cupolas. Sulfur content runs approximately 0.50 pct; ash 0.2 pct; and free carbon about 98 pct.

Iron Ore for Japan—Purchasing agencies for Japanese steel producing interests have been active on the West Coast seeking sources of iron ore. Two separate groups are planning shipments from deposits in Nevada and exploration work is under way in British Columbia.

Argonaut Mining Co. is making test drills at Quinsam Lake, about 14 miles from the Campbell River, and the Huto Nue Corp. of San Francisco is making test drillings on Texada Island.

Western Aluminum Outlook—Northwest aluminum plants will have to expand approximately 60 pct, from 320,000 short tons to 517,500 short tons, to maintain their relative production to national capacity by 1960. This is the forecast of Nathanael H. Engle, director, Bureau of Business Research, University of Washington.

Since producers pay freight in excess of $8 a short ton on alumina, Northwest producers would improve their competitive position by building Bayer process alumina plants in that area, Mr. Engle states.

Scrap Policemen—Some dealers are taking a cut in profits by outbidding one another for the little West Coast scrap available. In the Los Angeles area, dealers and consumers are finding it convenient to keep spotters posted near competitors' yards to find where the scrap is coming from and where it is going. The trade expects OPS inspectors to move in any minute.

Accenting the situation, the government last week allocated an appreciable quantity of railroad and industrial scrap from California to the Pacific Northwest—when California steel plants are living on borrowed time in spite of record breaking steel production as of this week.

Inequities Charged—United Steel Workers of America, bargaining agent for a large part of the nonferrous metals industry, is putting its sights in this year's bargaining on claimed wage inequities rather than on a straight percentage increase.

Wage contracts are generally up for renewal July 1 and negotiations are under way with some of the major companies, including Kennecott Copper Corp. and American Smelting & Refining Co. The union hopes to duplicate its wage program of 3 years ago which resulted in substantial increases to level out job and area inequities.

Little Real Help—Experienced shipbuilding executives took little heart from statements last week in San Francisco by Sen. Warren A. Magnuson that eight or more of the 32 new Mariner class cargo ships now projected would be built in West Coast yards.

Not doubting the Washington senator's sincerity, these shipbuilders doubt higher western costs will be accepted short of a war economy.

Can You Use an Atom?—Stanford Research Institute at Palo Alto, Calif., is engaged in a study to familiarize industry with the characteristics of by-products of the atomic process carried out at Hanford, Wash.

These radioactive by-products are far less expensive than other radioactive materials. They can kill organisms, induce chemical reactions, ionize gases, activate phosphors, and produce rays which can penetrate solids.

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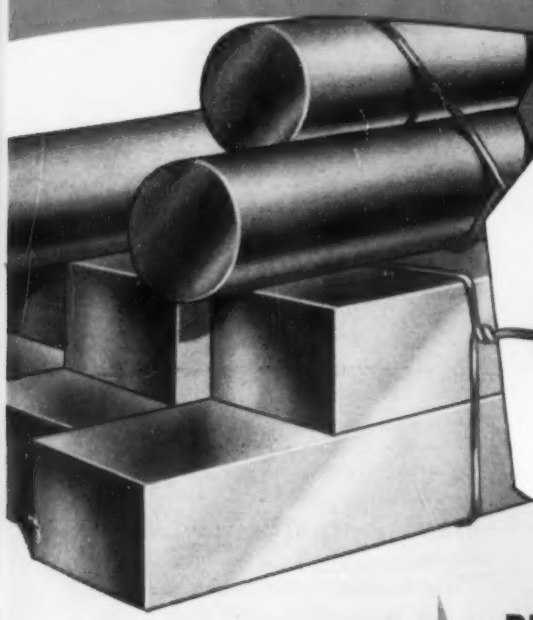

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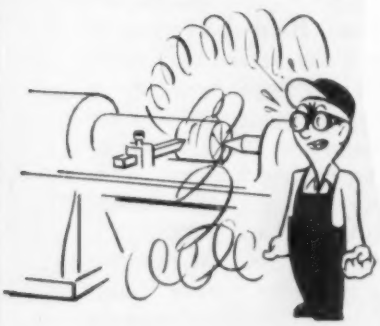

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LATROBE ELECTRIC STEEL COMPANY

LATROBE, PENNSYLVANIA

the federal view

this week in washington

by Eugene J. Hardy

Controls On Griddle—Congress, through its Joint Defense "Watchdog" Committee, began this week to go over the economic mobilization picture. Before these hearings are concluded some 50 government and industry witnesses will have given their views on the control program.

Primary purpose is to determine changes needed in the basic control law and the Defense Production Act to expire on June 30. There appears to be little doubt that the act will be extended for at least a year, but major changes are likely.

There is a better than 50-50 chance that Congress will re-write two provisions that are of prime importance to industry—those relating to materials controls and fast amortization of defense facilities.

Why CMP?—Reflecting an ever-spreading attitude in the control agencies, many members of Congress are becoming increasingly skeptical over the need for a Controlled Materials Plan for basic materials, even of the open-end variety.

They contend CMP would bear down too hard on the civilian economy in a period of only limited mobilization. They also point to the vast industrial expansion underway, which in a few years should provide enough materials for military needs plus a high-level civilian economy.

Alternate Plans—NPA officials, although ready to institute an open-end CMP by July 1, are also studying alternative plans, for it is obvious that the present system of DO priorities and special programs is heading for the rocks.

The delay in determining whether CMP is to be set up, also makes it appear that an effective plan could not be operating until the fourth quarter, according to NPA sources.

Unlike World War II, the CMP problem reveals almost complete lack of unity in thought among the various affected agencies.

Tax Writeoff Changes—The badly-muddled fast amortization situation (THE IRON AGE, Mar. 29, p. 81) will also be gone into thoroughly at these hearings. Chairman Maybank, D., S.C., is disturbed over the indiscriminate granting of certificates to dubious projects, many of which the Defense Production Administration would now like to cancel, and the resultant loss in Federal revenue.

Price Order Stalled—Lack of agreement on a method for removing most manufacturers' prices from the General Ceiling Price Regulation pervades the Office of Price Stabilization. This regulation, a temporary measure for manfacturers' prices until specific regulations can be worked out, is in the second draft stage, but appears to be far away from final form.

The basic premise of this order setting prices at pre-Korean levels with allowances for direct cost increases—is also the major industry objection, for it would make inadequate allowances for indirect boosts, escalator clauses in union contracts and many other important cost factors.

Undecided Yet—Actually, OPS has not even decided what industries would be covered by such an order. Industries for which a specific order could be worked out within a reasonable time would be excluded.

The confusion in this situation can be best illustrated by the fact that President Truman hopes to get prices back to pre-Korean levels; the manufacturers' order would allow some increases since Korea; and Price Administrator DiSalle says the best that can be hoped for is a general levelling of prices at January levels.

Building Ban Not So Tight—The freeze on commercial types of construction may not turn out to be the bogey that had been expected—that is, from the standpoint of getting NPA approval. To date, the agency has been unexpectedly lenient in its decisions, obviously giving most emphasis to whether a store or other facility is actually needed by a community.

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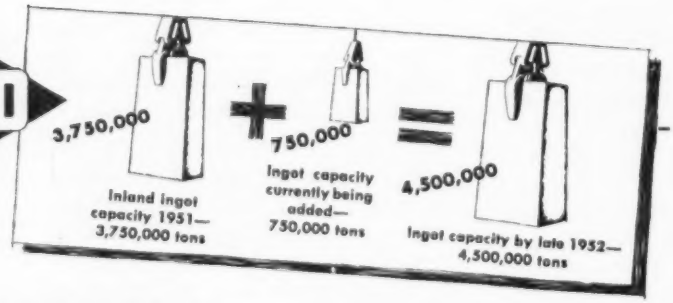

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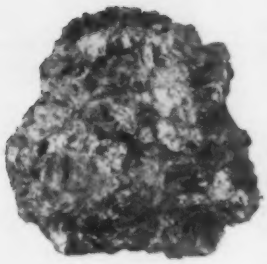


TEN ZIRCONIUM ALLOYS EVALUATED

By F. B. Litton
Senior Metallurgist
Foote Mineral Co., Philadelphia

Commercial purity zirconium has been in production for some time. Most of the production has been used by the Atomic Energy Commission. Because of its excellent corrosion resistance, commercially pure zirconium will eventually find wide application in everyday commercial use. Very recently the Foote Mineral Co. completed their research of the possible alloys of zirconium under sponsorship of the Engineering Div., Air Materiel Command, Wright-Patterson Air Force Base. The alloys, although less corrosion resistant, offer improved mechanical properties.

Foote Mineral Co. has conducted an exhaustive research into the possible alloys which could be effectively used. Many elements were discarded early in the program and the search for the best alloy narrowed down to ten, two of which were gases, oxygen and nitrogen. A typical analysis of commercially pure zirconium is shown in the box.

As a guide to an exploratory research program, attempt was made to select metals which would most likely form substitutional solid solution alloys with zirconium, using empirical considerations suggested by Hume-Rothery.[1] The percent difference in interatomic distances of possible solute metal atoms and atoms in the alpha zirconium lattice are shown in Table I. The structure type and boiling temperature are also tabulated.

The metals having interatomic distances within 20 pct of zirconium were divided into two classes, depending on their boiling temperature

The mechanical and oxidation resistance properties of ten zirconium alloys cover ten alloying elements including oxygen and nitrogen. Hafnium up to 8.2 pct did not affect tensile properties. Aluminum increased strength as did titanium, tantalum, columbium, oxygen and nitrogen. In general zirconium alloys are not as resistant to oxidation as the commercially pure metal.

relative to the melting point of zirconium, 1750°C. The low boiling group also included metals possessing distinct electropositive and electronegative chemical behaviour. These metals were magnesium, indium, lithium, cadmium, thalium, antimony, cerium and zinc.

When the preceeding metals were eliminated, solubility was predicted on addition of hafnium, tin, titanium, silver, aluminum, tantalum, columbium and lead. Previous work indicated tin and aluminum formed intermetallic compounds, while titanium was completely miscible in zirconium. Lead was eliminated from the exploratory program due to differences in density and melting point relative to zirconium.

Six Elements Are Borderline

The remaining group was classed as borderline metals. They were tungsten, thorium, manganese, vanadium and copper. Copper was included in this group primarily because of its similarity to silver. Due to complexity of the manganese lattice, intermetallic compounds were predicted.

Elements predicted to form interstitial solid solution with zirconium were oxygen and nitrogen. These elements have small atomic radii, and the interatomic distances are not shown in Table I. However, their embrittling effect in relatively high concentration on zirconium was generally known.

From these considerations, the zirconium alloy program was outlined to obtain preliminary tensile and oxidation data on the following alloying elements: Hafnium, titanium, aluminum, tantalum, columbium, tungsten, molybdenum, copper, oxygen and nitrogen.

TABLE I

INTERATOMIC DISTANCES AND BOILING POINTS

Element	Lattice Structure Type	Interatomic Distance, A°	Difference in Interatomic Distances, pct	Boiling Temp.,[2] °C
Zr	H.C.P.	3.18	—	—
Hf	H.C.P.	3.13	0.95	—
Mg	H.C.P.	3.19	0.95	1110
In	Tetra.	3.24	2.53	1450
Li	B.C.C.	3.032	4.65	1370
Sn	Tetra.	3.016	4.61	2270
Cd	H.C.P.	2.973	6.91	765
Ti	H.C.P.	2.91	7.91	b3000
Tl	H.C.P.	3.401	7.63	1330
Sb	Rhomb.	2.898	8.29	1440
Ag	F.C.C.	2.884	8.75	2210
Al	F.C.C.	2.858	9.56	2060
Ta	B.C.C.	2.854	9.68	b4100
Cb	B.C.C.	2.853	9.71	b3300
Pb	F.C.C.	3.493	10.52	1740
W	B.C.C.	2.735	13.46	5930
Th	F.C.C.	3.590	12.61	b3000
Mo	B.C.C.	2.719	13.95	4800
Ce	H.C.P.	3.63	14.86	1400
Mn	B.C.C.	a2.69	15.18	2150
Zn	H.C.P.	2.659	15.85	906
V	B.C.C.	2.627	16.82	3400
Cu	F.C.C.	2.551	19.30	2600

[2] Data obtained from Metals Handbook, 1948, and Langes' Handbook of Chemistry, Sixth Edition.
a = about.
b = less than.

TABLE II

TENSILE PROPERTIES OF ZR-HF ALLOYS

Hafnium Content, pct	Yield Strength,** psi, X1000	Tensile Strength, psi, X1000	Elongation pct	Type Specimen	Heat* Treating Temp, °C	Time at Temp, hr
0.10	24.4	45.9	1.0	Crystal Bar	925	1
0.12	38.6	62.1	1.5	Crystal Bar	925	1
0.10	21.5	41.9	14.5	Crystal Bar	800	2
0.80	34.6	58.2	5.0	Crystal Bar	800	2
2.34	15.7	35.1	26.5	Arc Melt	700	16
2.34	41.5	69.7	5.0	Arc Melt	900	16
2.68	23.6	39.6	19.0	Crystal Bar	900	2
6.20	21.3	49.1	12.0	Arc Melt	700	16
8.20	24.6	50.5	3.5	Crystal Bar	925	1

* Specimens wrapped in Zr and sealed in welded cans back-filled with Argon. Air cooled from heat treating temperature.
** At 0.05 pct offset.

Alloy Preparation by 4 Methods

The four methods used for preparing zirconium alloys during this investigation are listed in the box. Melting in graphite crucibles appears to have more immediate commercial promise than the other three methods, even though carbon contamination was anticipated. The extent of carbon contamination was assumed to be a function of time-temperature relationship and the chemical activity of the molten alloy.

At the temperature of molten zirconium, carbon in contact with refractory oxides used for crucible lagging might react to form carbon monoxide, thereby introducing both carbon and oxygen in the melt. For this reason, the carbon resistor furnace, proposed by Kroll, was preferred over high frequency melting. However, during this work, due to the simplicity of constructing a vacuum high frequency furnace, induction melting in graphite was the first method used for alloy preparation.

Graphite Crucibles Discarded

When it was apparent that the oxidation resistance of zirconium was deleteriously affected by melting in graphite, an arc furnace was constructed for alloy preparation. The furnace consisted of a water-cooled copper crucible and movable tungsten electrode, and the capacity was about ¼ lb.

The arc melted alloys were prepared under zirconium gettered argon introduced from a rubber balloon. The pancake-shaped ingots were melted on both surfaces, using 400 amp dc current at 20 v.

Alloy preparation by codeposition from mixed iodides presented a unique method for producing relatively pure alloys. Unfortunately, however, little was known about the kinetics of such reactions, and time did not permit full exploration

of the method. Many alloy systems would not be suitable for preparation by this method because of the low vapor pressure of their iodides at the operating temperature of the zirconium deposition cell.

Tensile Properties of Zirconium Alloys

The tensile properties of zirconium-hafnium alloys are recorded in Table II. Sheets used for tensile tests were obtained from cold-rolled iodide bar and arc melted iodide metal rolled at 400°C. All the tensile data in this report were obtained on 0.025-in. sheets, machined to 0.250-in. wide by 2-in. gage.

Hafnium content of the zirconium alloys was varied by using the following raw materials for sponge preparation: (a) Zirkite, (b) Zircon, and (c) chemically treated ZrO_2 in which the normal hafnium content (0.5 pct) of Zirkite was either decreased or increased by precipitation with trimethylphosphate in sulfuric acid solutions.

Hafnium was observed to have no effect on the tensile properties of zirconium alloys, containing from 0.1 to 8.2 pct Hf. The tensile properties were identical within experimental error. The poor elongation values obtained on specimens air-cooled from above the transformation was attributed to differences in rate of cooling and minor differences in impurity content.

The maximum tensile and yield strengths were obtained at approximately 50 pct titanium addition. Tensile properties of the titanium alloy series are recorded in Table III. The ingots were prepared by arc melting a codeposited alloy and vacuum melting iodide metals by induction in graphite crucibles. The arc melted alloy, 3.2 pct Ti, was rolled unsheathed in air at 400°C; while the graphite melted alloys, 15 to 85 pct Ti, were sheathed and rolled at 900°C.

TABLE III

TENSILE PROPERTIES OF ZR-TI ALLOYS

Titanium Content, pct	Yield Strength,* psi, X1000	Tensile Strength, psi, X1000	Elongation, pct in 2-in.	Condition
3.2	42.6	85.4	17.3	Annealed 700°C
3.2	83.5	134.6	7.2	As-rolled 400°C
15.0	74.2	90.8	1.5	Annealed 725°C
35.0	110.0	138.8	2.7	Annealed 725°C
35.0	97.6	148.4	5.0	20 pct Cold-reduced
50.0	113.2	140.4	1.5	Annealed 725°C
50.0	89.4	132.4	1.0	20 pct Cold-reduced
65.0	115.0	125.9	1.2	Annealed 725°C
65.0	114.0	138.9	0.5	20 pct Cold-reduced
85.0	78.0	101.4	1.0	Air-cooled 900°C

* At 0.05 pct offset.

TABLE IV

TENSILE PROPERTIES OF ZR-AL ALLOYS

Aluminum Content, pct	Yield Strength,* psi, X1000	Tensile Strength, psi, X1000	Elongation, pct in 2-in.	Condition
1 (a)	82.6	81.3	5.6	Annealed 725°C
2 (a)	96.1	111.9	3.3	Annealed 725°C
4 (a)	113.2	122.0	12.0	Annealed 725°C
1 (b)	72.8	99.1	8.7	As-rolled
1.5(b)	99.9	131.9	8.9	As-rolled
2 (c)	91.2	112.8	0.5	Annealed 700°C

(a)—Vacuum melted in graphite. Rolled sheathed at 900°C.
(b)—Arc melted. Rolled in air at 600°C.
(c)—Arc melted. Rolled in air at 450°C.
*—At 0.05 pct offset.

TABLE V

TENSILE PROPERTIES OF ZR-TA ALLOYS

Tantalum Content, pct	Yield Strength,* psi, X1000	Tensile Strength, psi, X1000	Elongation, pct in 2-in.	Condition
0.5(a)	13.0	41.7	24.0	Annealed at 700°C
1.0(a)	13.0	43.7	19.0	Annealed at 700°C
2.5	35.7	84.6	17.0	Annealed at 725°C
2.5	59.5	90.5	3.0	Cold-reduced 80 pct
3.0(a)	21.8	54.7	15.2	Annealed at 700°C
7.5	50.2	75.6	17.5	Annealed at 725°C
7.5	59.4	96.0	3.5	Cold-reduced 80 pct
12.5	41.0	111.5	2.5	Cold-reduced 80 pct
17.5	97.2	138.8	0.8	Heat-treated(b)
22.5	93.6	111.4	4.0	As-rolled
27.5	100.2	105.7	3.0	As-rolled

(a) Arc melted. Rolled at 400°C. Other alloys in this series were melted in vacuum in graphite crucibles. Rolled sheathed at 900° C.
(b) Quenched from 1000°C. Aged 2 hr at 500°C.
* At 0.05 pct offset.

Method of preparation

(a) Vacuum melting in graphite crucibles using either high-frequency current or a carbon resistor sleeve for heating.

(b) Arc melting on a water-cooled copper crucible under purified inert atmosphere.

(c) Codepositing the alloy in an improved deBoer deposition cell.

(d) Diffusion of element into zirconium.

The tensile and yield strength of zirconium-aluminum alloys are tabulated in Table IV. The results include data on alloys prepared by both arc melting and induction melting carried out in graphite crucibles.

Aluminum Decreases Workability

It was observed that arc melted alloys possessed better workability than similar alloys prepared by graphite crucible melting. The workability of alloys in this series was decreased by aluminum addition, and, although alloys containing more than 4 pct Al were prepared, they were not satisfactorily rolled into sheets. Alloys in this series possessed good strength characteristics coupled with satisfactory elongation.

Tensile properties of zirconium-tantalum alloys are shown in Table V. Alloys melted in graphite crucibles containing up to 27.5 pct Ta were readily worked at 900°C. After the initial breakdown, they were cold-rolled 80 pct reduction. Maximum strength was observed at about 17.5 pct Ta addition. Alloys in this series responded to heat treatment.

Alloys in the zirconium-columbium series were

less workable than similar alloys in the tantalum series. In the zirconium-columbium series maximum strength was observed at about 7.5 pct Cb in alloys prepared in vacuum in graphite crucibles. Tensile properties are tabulated in Table VI.

The tensile properties of zirconium-tungsten alloys containing low tungsten additions are recorded in Table VII. Alloys which could be worked at low temperatures to relatively high strengths possessed greater potential commercial application than alloys depending primarily on metal alloy addition for strengthening characteristics. The properties of 0.5 pct W-Zr alloy, worked below the recrystallization temperature of zirconium, compared favorably with properties of the higher strength alloys in the aluminum and titanium series.

The tensile properties of arc melted zirconium-molybdenum alloys were similar to those observed for the zirconium-tungsten series. The tensile properties are tabulated in Table VIII. The elongation values were erratic, which was attributed more to the thermal history of the specimen than to its molybdenum content.

The tensile properties of zirconium-copper alloys are shown in Table IX. Copper addition up to 2.9 pct did not appreciably increase the strength of arc prepared melts.

TABLE VI
TENSILE PROPERTIES OF ZR-CB ALLOYS

Columbium Content, pct	Yield Strength,* psi, X1000	Tensile Strength, psi, X1000	Elongation, pct in 2-in.	Condition
2.5	83.3	87.5	9.0	Annealed at 725°C
7.5	93.7	107.0	1.0	Annealed at 725°C
12.5	81.5	102.2	2.0	Annealed at 725°C
17.5	78.7	91.2	1.0	Annealed at 725°C
22.5	67.5	72.5	....	Annealed at 725°C
27.5	57.0	74.3	1.0	Annealed at 725°C

* At 0.05 pct offset.

TABLE VII
TENSILE PROPERTIES OF ZR-W ALLOYS

Tungsten Content, pct	Yield Strength,* psi, X1000	Tensile Strength, psi, X1000	Elongation, pct in 2-in.	Condition
0.3	23.9	56.0	18.0	Annealed at 700°C
0.5	32.6	67.7	17.3	Annealed at 700°C
0.5	88.5	127.4	5.3	As-rolled 400°C
1.0	82.1	110.2	7.3	As-rolled 825°C

* At 0.05 pct offset.

TABLE VIII
TENSILE PROPERTIES OF ZR-CU ALLOYS

Copper Content, pct	Yield Strength,* psi, X1000	Tensile Strength, psi, X1000	Elongation, pct in 2-in.	Condition
0.9	78.2	128.7	4.0	As-rolled 400°C
0.9	15.0	48.4	17.7	Annealed at 700°C
2.9	74.6	137.7	1.5	As-rolled 400°C
2.9	23.7	57.4	9.0	Annealed at 700°C

* At 0.05 pct offset.

TABLE IX
TENSILE PROPERTIES OF ZR-MO ALLOYS

Molybdenum Content, pct	Yield Strength,* psi, X1000	Tensile Strength, psi, X1000	Elongation, pct in 2-in.	Condition
0.4	89.8	129.7	5.2	As-rolled 400°C
0.4	26.8	58.2	20.0	Annealed at 700°C
0.9	83.7	126.2	0.2	As-rolled 400°C
0.9	28.4	68.6	18.5	Annealed at 700°C
1.0	86.8	131.4	nil	As-rolled 825°C
6.0	116.2	144.0	nil	As-rolled 825°C

* At 0.05 pct offset.

O_2 & N_2 Harden Zirconium

The tensile properties of zirconium alloys containing oxygen and nitrogen are summarized in Figs. 1 and 2. The intended composition was varied by hardener addition during arc melting up to 0.3 pct oxygen and 0.15 nitrogen. After rolling in air at 400°C, the composition shown in Fig. 1 was determined by analyzing for oxygen by the HCl method and for nitrogen by a modified Kjehdahl procedure. Tensile data were obtained on 700°C annealed specimens.

The tensile and yield strengths are plotted against the combined oxygen and nitrogen contents in Fig. 1. Scatter in results was attributed to probable difference in alloying effect of oxygen and nitrogen and inaccuracies in reported analyses. However, the results demonstrate that oxygen and nitrogen satisfactorily combine with zirconium to form relatively high strength alloys possessing good elongation values in the annealed condition.

In the alloy series, the ratio of tensile to yield strength varied from 0.32 to 0.73 and increased with total oxygen and nitrogen content. In an alloy containing 0.058 pct O_2 and 0.013 pct N_2 (typical analyses for iodide metal arc melted with no hardener addition) the ratio was 0.32,

Typical composition of iodide zirconium

Element	Spectrographic Value, pct	Chemical Analysis Value, pct
Aluminum	0.01—0.02	None detected
Calcium	0.005—0.01	Ditto
Copper	Present	None detected
Hafnium	2.58	—
Iron	0.005—0.01	0.21
Magnesium	0.005—0.01	0.30
Nickel	Present	0.21
Silicon	0.01/0.05	0.08
Titanium	0.0001—0.005	None detected

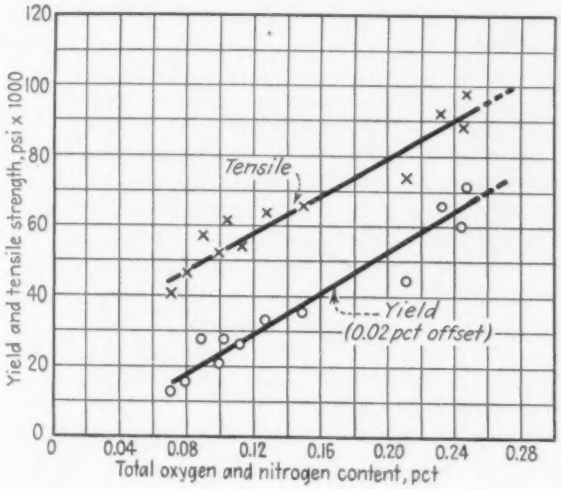
Above reprinted from AECD-2726 report "The Properties of Zirconium" by F. W. Boulger, Battelle Memorial Institute.—Ed.

while in an alloy containing 0.102 pct O_2 and 0.145 pct N_2 (the approximate composition limit for ingot reduction at 400°C), the ratio increased to 0.73. The minor variation in composition of alloys in this series resulted in increasing the tensile and yield strengths approximately 2.4 and 5.6 fold respectively, and decreasing the elongation only 11.1 pct. The highest strength alloy, containing 0.102 pct O_2 and 0.145 pct N_2, had 71,600 psi yield and 97,800 psi tensile strengths and 13.1 pct elongation. The tensile strength was plotted against Rockwell A hardness and elongation. The plot is shown in Fig. 2.

Reference

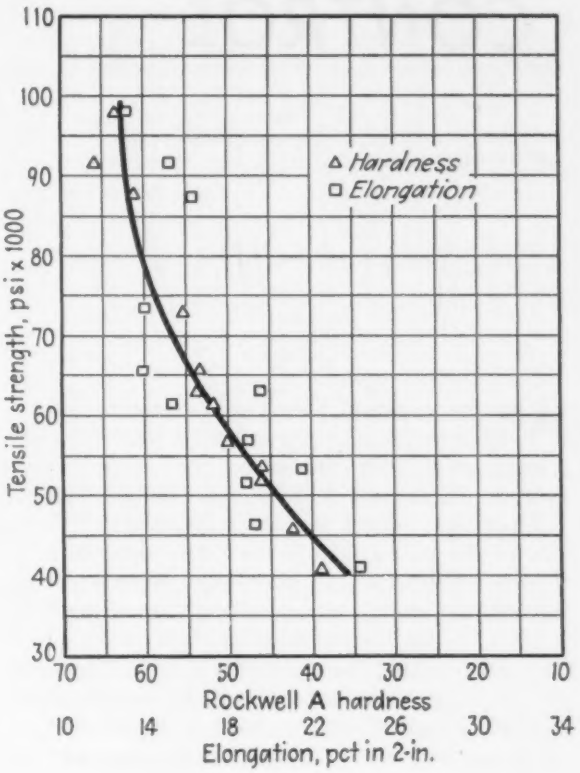
[1] *William Hume-Rothery, "Structure of Metals and Alloys," Inst. of Metals, Monograph No. 1, 1947.*

FIG. 1—The effect of oxygen and nitrogen combined on the tensile and yield strengths of samples annealed at 700°C.



Part II, the concluding part, of this article will appear in the April 12 issue and will include photomicrographs of the various alloys reported here. Results of oxidation tests for all alloys are also reported.

FIG. 2—Tensile strength, hardness relationships on the oxygen plus nitrogen alloy plotted in Fig. 1.



NEW BOOKS

Tool Engineering, Analysis and Procedure, by L. E. Doyle, is aimed at presenting the important procedures of tool engineering, explaining the reasons for the procedures and showing how problems may be solved more exactly by analytical methods based upon engineering fundamentals. While intended primarily for a college course, the text should be of value to graduate engineers in assisting them to make the most of their training when engaged in tool engineering. Prentice-Hall, Inc., 70 Fifth Ave., New York 11. $6.35. 500 p.

Die Design and Diemaking Practice, edited by F. D. Jones, is a treatise for die designers and diemakers containing illustrated descriptions of a large variety of selected dies for all kinds of power press operations. This third edition of the book has been extensively revised with five new chapters added dealing with sheet-metal working dies. Practical information and data are given on approved designing practice and die construction. The Industrial Press, 140-148 Lafayette St., New York 13. $7.00 1014 p.

Pattern for Industrial Peace, by W. F. Whyte, is a success story of human relations. It is the actual story of men—workers and managers—who fought to a deadlock, and then discovered that their differences could be resolved with a victory for both sides. Some of the most basic problems of industrial human relations are illuminated, and the book provides insight into the forces that have made the labor headlines of our generation. Harper & Bros., 49 E. 33rd St., New York 16. $3.50. 246 p.

A new electronic control makes possible good quality resistance welds with conventional single-phase 60-cycle ac equipment. Tip aluminum pickup is reduced, and electrode life increased 20 to 30 times.

SLOPE CONTROL aids AC welding of aluminum

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Any conventional 60-cycle ac welder can be used to produce good quality welds in aluminum, when used with a new type of electronic control. Electrode life is increased 20 to 30 times.

When spotwelding ferrous materials, deformation of the tip surface is the factor determining tip life. When welding aluminum, however, it is tip pickup that determines tip life. Tip pickup is a function of tip temperature. So one of the ways that helps to lengthen tip life is to refrigerate the tips and thus hold down their temperature during welding.

Another method is to control the application of the welding current so that the current is allowed to build up gradually, instead of applying the full current immediately. This is easy to do with stored-energy type welders. But until recently, it was not practical to control the current in this manner when using conventional single-phase ac welders.

Now electronic devices have been developed to provide this control when spotwelding with conventional 60-cycle ac machines. These slope controls restrict the current flow during the first few cycles, allowing it to build up gradually to maximum welding current. Lengthening by a few cycles the time the welding current flows, compensates for the reduced current at start of weld, thereby giving the same total heat input to the weld.

Table I shows the effectiveness of slope control in extending electrode life. The number of welds made before sticking occurs is increased 20 to 30 times with slope control.

The factors that extend electrode life are evident in Figs. 1 and 2. These are diagrams produced from actual oscillograph records of spotwelds made with and without the slope control.

In Fig. 1, without slope control, the first and each succeeding half cycle of current goes to the same peak as maximum welding current before reversing to complete the cycle. This first high current pulse softens the metal considerably, reducing the electrode pressure at the electrode-work interface as is shown by the comparatively large drop in the pressure curve. In Fig. 2, with slope control, the current gradually increases during the first 4 to 6 cycles, producing a gradual softening of the metal.

Table II shows current densities and unit force at the tip. These values were calculated from the calibrated oscillograph charts from which Figs. 1 and 2 were made. It will be seen that the initial current densities with slope control are less than one-third of those without slope control.

Higher current densities are always accompanied by more heat and higher temperatures. In fact, the amount of heat developed is directly proportional to the current density. So a reduction in current density means a direct reduction in tip temperature. Thus, the slope control ac-

TABLE I

ELECTRODE LIFE INCREASED

Material Thickness, in.	Number of Spots Before Sticking Without Slope Control	With Slope Control
On Alclad 24S-T Aluminum		
0.025	18	300
0.040	25	825
0.064	41	1125
0.081	85	1700*
On 52S Aluminum		
0.062	60	450

* Tests discontinued before sticking occurred.

counts for producing less than one-third the heat that was developed without slope control.

There is also another significant factor—higher unit pressures. This is important because the heat developed at the point of contact between the electrode tip and the work surface varies inversely with the pressure. More than twice the pressure produces less than half the heat.

Combining these two factors, it is evident that the slope control, in this instance, cuts the total amount of heat produced to something less than one-sixth. Thus, there is an important reduction in temperatures at the contact surface between electrode tip and work. This means that sticking and deposition of aluminum on the electrode tips are greatly reduced, because the deposition of aluminum is directly proportional to the temperature at point of contact.

Tip Contact Area Increased

Without slope control, the electrode tip must carry the full welding current before it gets a chance to sink into the softening metal and seat itself. With slope control, the aluminum softens at the tip-work interface and allows the tip to sink into the work slightly before the full welding current is applied Thus, when maximum current is reached, there is a considerable portion of the tip surface contacting the work and the current is distributed over this entire area so that excessively high current densities are not allowed to occur. This prevents sticking.

Evidence behind this theory is that slope control multiplies tip life 20 to 30 times. It indicates a new approach to some of the problems involved in single-phase resistance welding of aluminum with conventional ac machines. Eliminating pick-up is particularly significant in spotwelding aluminum and an important aid to quality work.

Slope control is in effect a variable resistor connected in series with the heat control potentiometer to reduce welding current during the first few cycles of the weld. Such equipment consists of auxiliary controls used in conjunction with the standard control panel. The required variation in resistance is obtained by varying the bias voltage of two GL-502A Thyratrons connected in inverse parallel.

Welding procedures have been established for

TABLE II

DENSITY-FORCE DATA

	Without Slope Control			With Slope Control		
Time in Cycles	Diam. of Imprint, in.	Current Density, amps per sq in.	Unit Force, psi	Diam. of Imprint, in.	Current Density, amps per sq in.	Unit Force, psi
1	0.19	770,000	12,500	0.14	285,000	26,000
2	0.19	770,000	13,100	0.15	250,000	22,000
3	0.20	700,000	11,800	0.18	695,000	15,500
4	0.20	700,000	11,200	0.20	700,000	14,000
5	0.20	700,000	11,200	0.20	700,000	12,500
6	0.20	700,000	11,200	0.20	700,000	11,200

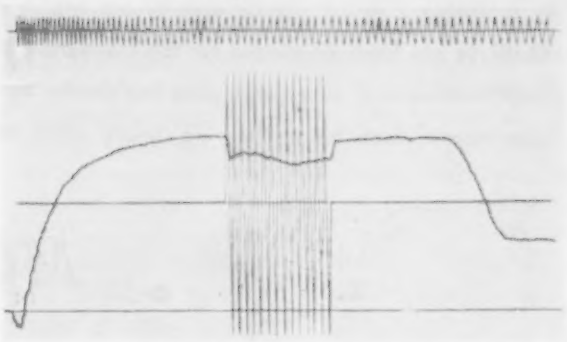
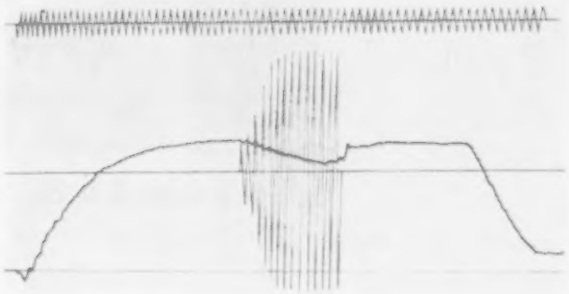


FIG. 1—Oscillograph traces of current (A) and electrode pressure (B) in welding .032-in. 52S aluminum with a single-phase, 60-cycle ac machine. No slope control was used.

FIG. 2—Oscillograph traces made under same conditions as in Fig. 1, except that slope control was added to the machine's control circuit.



use with this auxiliary equipment to produce spotwelds whose strength is equal to, or greater than, that called for in the Air Force—Navy Aeronautical Specification AN-W-30. These strengths can easily be obtained with conventional ac welders equipped with the slope control and standard electronic timing.

A recommended cleaning cycle for preparing the aluminum for spotwelding is as follows: Vapor degrease; alkaline clean at 180°F; cold water rinse; 15 to 20 sec in acid deoxidant at 70°F; cold water rinse; hot water rinse; and dry by air blast. Electrodes can be cleaned effectively by immersing the tip in a solution of sodium hydroxide which removes deposits of aluminum on the tip.

Class I, RWMA electrodes of the cadmium silicon-copper type with a 3-in. dome radius have been found satisfactory for welding all thicknesses of aluminum. The water hole is drilled to within ¼ in. of the welding surface and water supplied at approximate rate of 1 gpm.

Slope control also has important possibilities in projection welding. It has been demonstrated that it permits the production of projection welds without any of the customary metal expulsion at start of the weld.

In multiple projection welding, it is expected that use of slope control will greatly improve the consistency of the welds because of its tendency to make currents more uniform, especially at the very start of the weld.

By replacing 1 to 1.5 pct Cr with ½ pct Mo, a satisfactory substitute has been developed for the standard E-52100 steel. Heat treating and annealing cycles are shorter for Mo steels. Experimental moly-boron bearing heats were also tested.

MOLYBDENUM CAN REPLACE CHROMIUM

in bearing steels

By A. S. Jameson, A. D. Ellis, G. F. Meyer

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Molybdenum steels containing 1 pct C and 0.5 pct Mo have been investigated as a possible substitute for 1 pct C, 1.5 pct Cr steels for automotive ball bearing race rings. Such investigations have been stimulated by the current international situation; molybdenum ores are readily available in the U. S., whereas chromium ores of metallurgical quality are considerably removed from this area.[1]

Molybdenum steel has been used experimentally in ball bearings. Accelerated life test curves[2] show that when bearings with inner race rings made of 1 pct C, 0.5 pct Mo steel are compared with bearings made from AISI E-52100 steel, the molybdenum steel is a safe substitute. The heat-treating cycle may be cut in half with the molybdenum steel, with consequent economic advantage. The price of molybdenum is about four times that of chromium, but this is offset by the greater recovery in the steelmaking process. In addition, only one-third as much alloy is required to produce the same mechanical properties.

All elements are the same basic analysis as AISI E-52100, except that 0.40 to 0.60 pct Mo replaces 1.30 to 1.50 pct Cr, and the manganese range is increased to 0.40 to 0.60 pct. Table I shows the composition of 12 experimental heats of molybdenum steel, as well as the composition of the original heat reported on in earlier studies.[2] Eleven of the heats were produced in a laboratory induction furnace; heat 33471 was a 3-ton Heroult arc furnace heat. Heats 4462, 4463 and 4483 received aluminum additions in the ratio of 1¼ lb per ton. In heats 4624, 4625, 4626, 4630 and 4631, the aluminum addition was 1½ lb per ton; no addition was made to heat 4657.

As ball bearing race rings are hardened throughout their section, hardenability is one of the prime factors. Hardenability values obtained by the end quench test at austenitizing tempera-

TABLE I

COMPOSITION OF MOLYBDENUM STEELS

Identification	Element and Per Cent									
	C	Mn	P	S	Si	Mo	B	Cr	Ni	Cu
Original	0.94	0.35	0.019	0.014	0.22	0.48	Nil	0.08*	0.06*	
A	1.02	0.60	0.013	0.010	0.28	0.35	Nil	0.06*	0.12*	0.02*
B	0.95	0.66	0.013	0.010	0.27	0.48	Nil	0.06*	0.13*	0.04*
33471	0.99	0.53	0.010	0.015	0.20	0.47	Nil	0.08*	0.09*	0.18*
4462	0.76	0.51	0.010	0.025	0.26	0.47	Nil	0.10*	0.10*	
4463	0.88	0.52	0.010	0.020	0.29	0.48	Nil	0.10*	0.10*	
†4483	0.75	0.51	0.010	0.020	0.27	0.47	0.0006	0.10*	0.10*	
†4624	0.84	0.33	0.010	0.015	0.23	0.47	0.0015	0.10*	0.10*	
†4625	0.89	0.51	0.010	0.015	0.27	0.47	0.0011	0.10*	0.10*	
†4626	0.82	0.30	0.010	0.015	0.24	0.45	0.0010	0.10*	0.10*	
†4630	0.98	0.50	0.010	0.015	0.27	0.46	0.0007	0.10*	0.10*	
†4631	0.83	0.26	0.010	0.015	0.22	0.47	0.0007	0.10*	0.10*	
4657	1.02	0.41	0.010	0.020	0.16	0.50	Nil	0.15*	0.10*	

† Boron Treated
* Residual

TABLE II

HARDENABILITY OF MOLYBDENUM AND CHROMIUM STEEL

Identification	J-60 Rating and Austenitizing Temperature °F					
	1500	1525	1550	1575	1600	1650
Original	4.0	4.5	6.5	6.5	7.0	8.5
A	3.0	3.5	4.0	5.0		
B	4.5	5.5	6.0	8.0		
33471	4.0	4.0	4.5	5.0	5.5	6.0
4462	4.5	4.5	4.5	5.0		
4463	4.5	5.5	5.5	6.5		
†4483	5.5	7.0	7.0	7.0		
†4624	5.5	6.0	7.0	9.0		
†4625	6.0	6.5	7.0	14.0		
†4626	5.0	6.5	8.5	8.5		
†4630	4.5	5.0	5.5	6.5		
†4631	5.0	5.5	6.5	7.0		
4657	3.5	3.5	4.5	5.0		
52100	3.5	4.0	4.0	4.5	5.5	6.0

† Boron Treated

tures from 1500° to 1650°F are shown in Table II at a hardness level of 60 Rc. The J-60 rating of heat 33471 was 3.5 at 1400°, 1425°, 1450° and 1475°F.

Data on 50 heats of 52100 steel show a range of 4 to 6 in J-60 values at an austenitizing temperature of 1550°F. Assuming that a steel which falls within this range at the same austenitizing temperature is comparable to 52100, all of the molybdenum steels met the minimum requirements at 1550°F. Hardenability can be changed by raising or lowering either the carbon, molybdenum or manganese content, by the addition of boron, or by changing the inherent grain size which in turn affects the grain size produced at a given austenitizing temperature.

Boron Can Save Manganese

The effect of boron additions is of particular interest, because boron opens the way to a reduction in manganese content, an especially desirable factor right now. Definite conclusions regarding the effect of carbon, manganese, molybdenum and other elements are not warranted on the basis of hardenability data alone. Such other factors as grain size influence hardenability, and the evaluation of chemistry v. hardenability will be influenced by grain size.

The molybdenum steels showed some coarsening but these steels were finer grained than 52100 to start with so that at 1575°F the fractured grain size of the two were practically the same. The boron-treated steels, however, showed more tendency to coarsen and at 1575°F averaged a 7½ fracture grain size while 52100 at this temperature remained 8½ grain size.

Experimental heats A and B illustrate the effect of molybdenum content. The heat with the higher molybdenum content has higher hardenability, as shown in Fig. 1. Since these heats were made at the same time and for this definite purpose, the findings are likely to be reliable. In Fig. 2, the boron-treated heats are shown to have higher hardenability than the untreated heats, 4462 and 4483, which were also melted at the same time.

Steels used in bearings should be completely martensitic in structure. In view of the required quench hardness of 66 Rc, little if any of the higher temperature transformation products can be tolerated. The structure before heat treating consists of ferrite with spheroidal carbides. Sufficient carbon must be put in solution to obtain the desired hardness of 66 Rc. The carbide which is not required to obtain this hardness remains as undissolved carbides in the final structure.

A marked difference in the solubility of carbides is shown by the higher hardness obtained in the molybdenum than in the chromium steel for a given heat treatment, as illustrated in Fig. 3. The increase in hardness for each steel

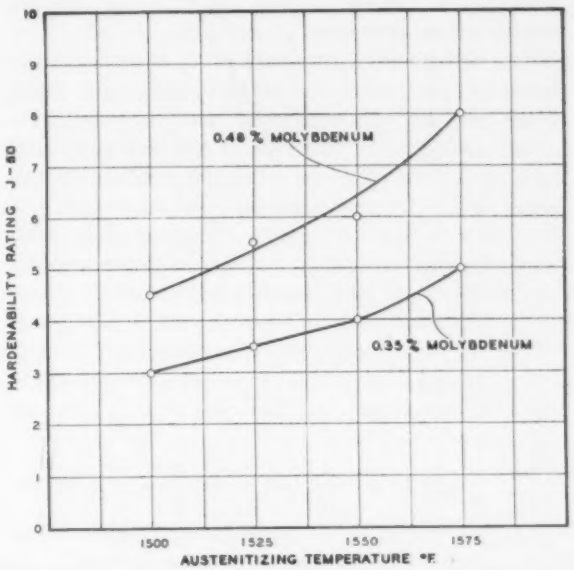
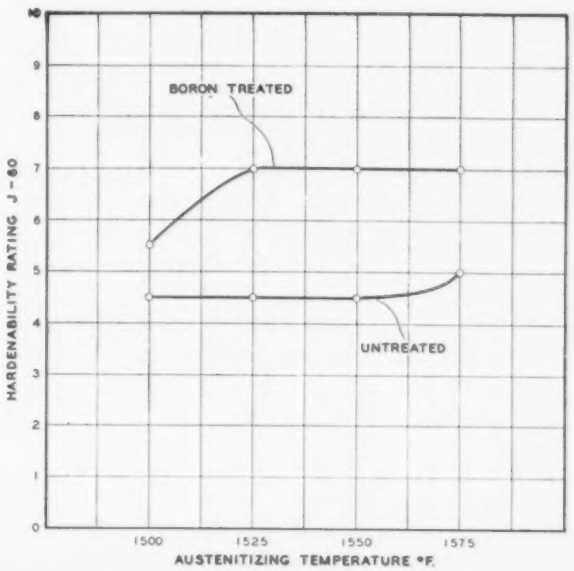


FIG. 1—The effect of molybdenum content on the hardenability of experimental heats A and B.

FIG. 2—The effect of boron on the hardenability of the new molybdenum type bearing steel.



by subzero treatment is also shown. The molybdenum steel attained 66 Rc on oil quenching after austenitizing for 15 min in a salt bath at 1450° to 1500°F. A chromium steel (1.10 pct C, 0.40 pct Mn, 0.20 pct Si, 1.42 pct Cr) had to be austenitized at 1600°F to achieve the same hardness in the same time.

Experimental heats 4462, 4463, 4483, 4624, 4625, 4626, 4630, 4631 and 4657 at austenitizing temperatures from 1425° to 1525°F exhibited the same general behavior. The molybdenum steel quenched to 66 Rc after only 5 min at 1500°F, whereas the chromium steel had to be held at 1525°F for 55 min to reach about the same hardness. These tests were made on ⅜-in. disks from the original heat and experimental heat 33471, Fig. 4. Again the effect of subzero treatment on hardness is included.

The difference in the rate of carbide solubility between the molybdenum and chromium steels gives the molybdenum steel an important economic advantage. The role of retained austenite in hardness is of some importance when considering molybdenum steel for ball bearings. A hardness of 66 Rc can be obtained with relatively short austenitizing times at lower temperatures than are used for chromium steel. However, it was shown in Figs. 3 and 4 that more austenite is retained in the molybdenum steel.

Ten samples of molybdenum steel (heat 33471) were austenitized for 25 min at 1525°F and

FIG. 3—Molybdenum steels can be hardened at lower temperatures. Subzero treatment causes a larger pickup in hardness in the new steel than the standard 52100. Study was conducted on ⅜-in. diam cylinders, 4 in. long.

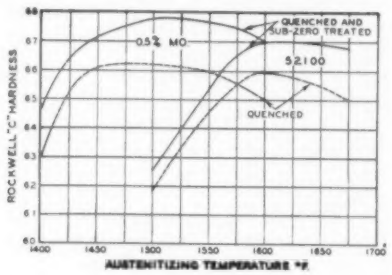
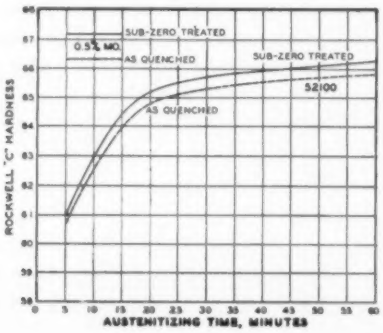


FIG. 4—Quenched hardness as affected by time at austenitizing temperatures. Subzero treated samples again compared. Sample size same as used in Fig. 3.



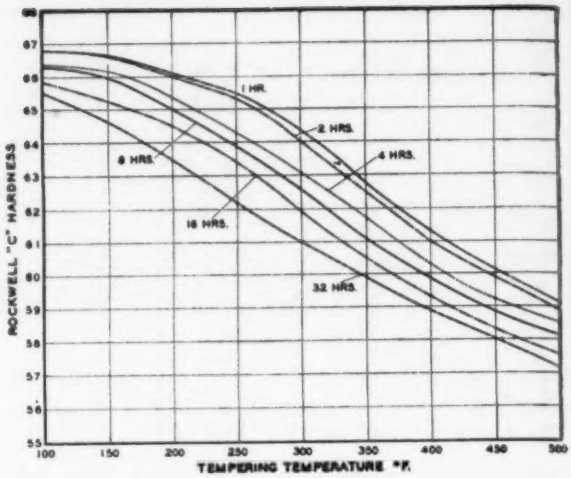
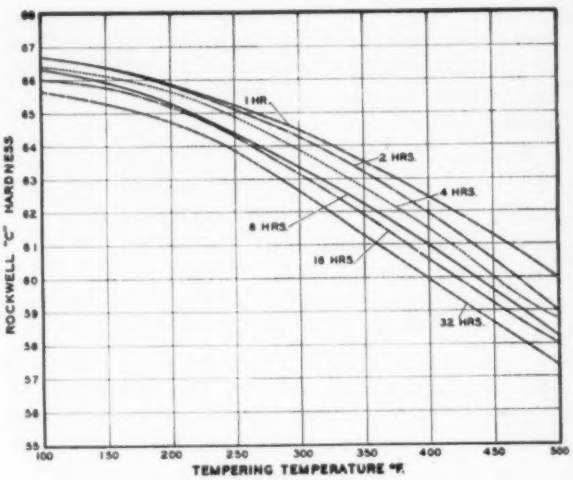


FIG. 5—The effect of tempering temperature and time on molybdenum steel, bottom, and chromium steel, top.



quenched in oil at approx 120°F. Determination of the retained austenite by X-ray diffraction gave values between 16 and 22 pct, with an average of 21 pct. Chromium steel treated in the same manner usually results in about 10 pct retained austenite. Both the chromium and molybdenum steels reached hardnesses around 66 Rc.

Explanation for the higher retained austenite is found in the fact that the carbides are more readily soluble in the molybdenum than in the chromium steel. Thus more carbon is in solution, and the higher hardness of the martensite accounts for the same overall hardness, despite a greater amount of retained austenite. When this condition exists, the quantity of undissolved carbide will be low.

Carbide determinations by an electron microscope method[3] on one of the 10 samples gave a value of 2 pct by volume. It will be necessary to determine the effect of varying amounts of undissolved carbide on accelerated life tests on bearings made of molybdenum steel before the full effect of carbide distribution can be determined.

It has not been firmly established that retained austenite in reasonable amounts is necessarily harmful to bearing life. Furthermore, the amount of retained austenite can be reduced by

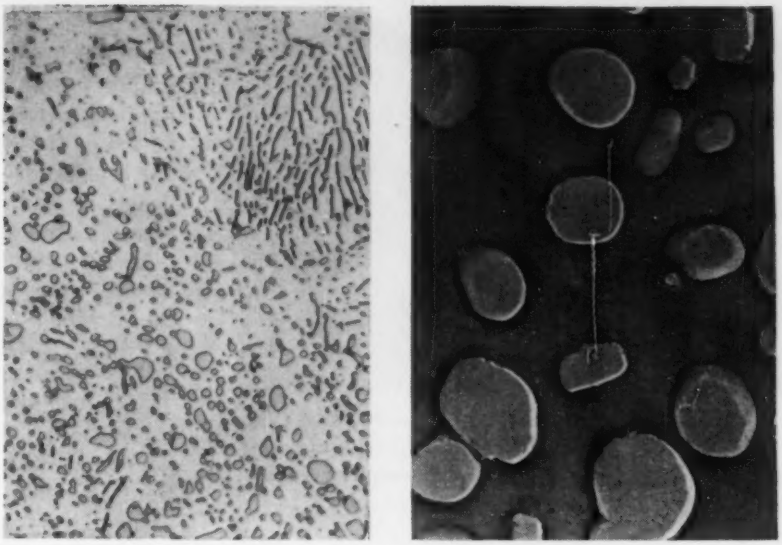


FIG. 6—Typical annealed microstructure of molybdenum steel shown at the left. An electron photomicrograph using a chromium shadowed Formvar replica appears at the right. Both samples were etched with 4 pct picral.

subzero treatment immediately after the quench. It is unlikely that subzero treatment will be necessary in actual practice, since the austenitizing temperature can be lowered and the hardness maintained in molybdenum steel.

There are two reliable methods for determining retained austenite, the first is the X-ray diffraction method using integrated intensities.[4] This method uses the co-existing martensite as an internal standard and has proved highly satisfactory. The second, a method of quantitative metallography[3] is based upon the principle of lineal analysis. The results obtained check within ±1 pct with the X-ray diffraction method, and the technique can also be used to determine carbide volume.

Ball bearing race rings are usually tempered to a hardness range of 60 to 65 Rc, with an aim of 63 Rc. The tempering temperature may vary between 300° and 400°F, with 325°F being the most commonly employed. The microstructure will then consist of tempered martensite, austenite, bainite, and some carbides.

Tempering curves obtained from ⅜-in. diam cylinders 4 in. long, quenched in oil (120°F) from 1550°F after austenitizing for 30 min in salt, are shown in Fig. 5. A different specimen was used for each tempering temperature; the same specimen was used for different times at temperature. A series of experiments were run in which the molybdenum and chromium steels were progressively tempered at between 200° and 400°F at 50° intervals, and thereafter at 100° intervals to 600°F. One series was tempered from the oil quenched condition, and the other series from the quenched and subzero-treated

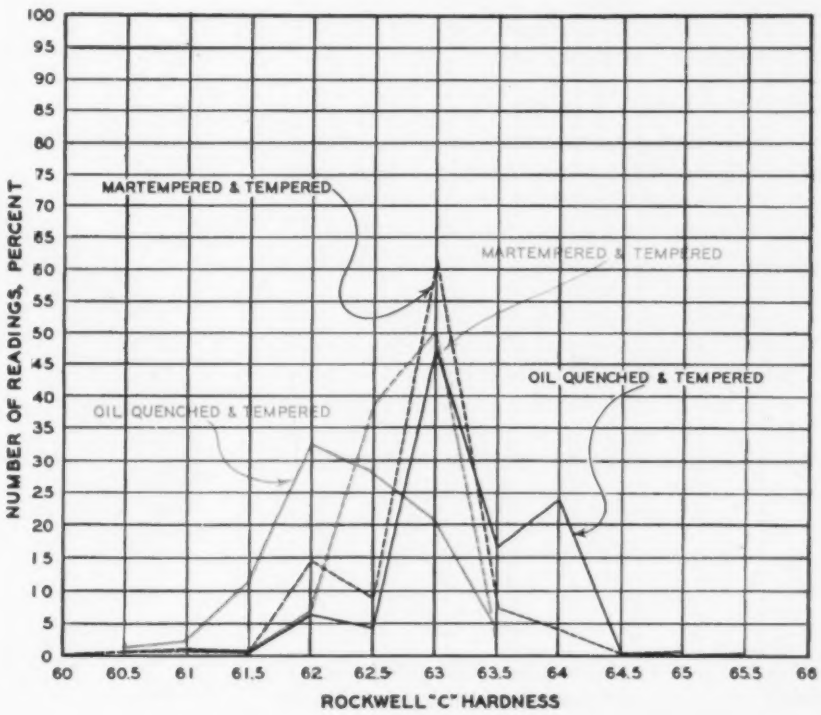


FIG. 7 — Frequency distribution tempered hardness curves for molybdenum and chromium race rings. The colored lines are the chromium curves.

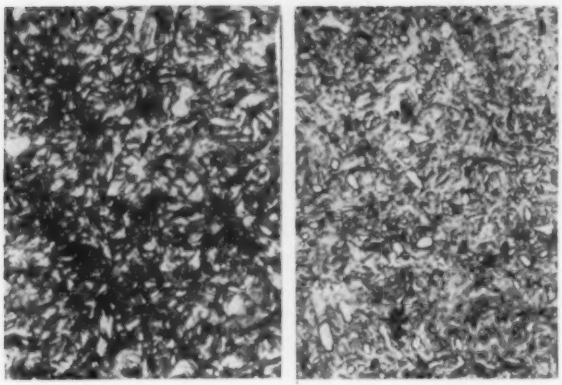


FIG. 8—Microstructures of hardened molybdenum race rings. Etched with 2 pct Nital, 1000X. The oil quenched and tempered sample is shown at right, martempered and tempered at the left.

condition; the hardness of the subzero-treated series was from 1 to 2 points higher. This was true for an austenitizing temperature range of from 1400° to 1500°F for the molybdenum steel, and from 1575° to 1675°F for the chromium steel. The austenitizing time was constant, being 15 and 20 min respectively.

In another series of tests, ⅜-in. disks of the molybdenum and chromium steels were austenitized at from 1400° to 1500°F for the molybdenum steel and at from 1575° to 1675°F for the chromium steel, and progressively tempered at from 200° to 600°F. The chromium steel had almost the same tempered hardness as the molybdenum steel austenitized from 1400° to 1500°F at the same tempering temperature.

From still another series of tests, it was noted that tempered hardness is higher in both steels when the austenitizing temperature is increased. This effect is masked to some extent by the greater amount of retained austenite obtained by the higher hardening temperature.

Endurance Limits Similar

Rotating beam fatigue tests were made using R. R. Moore fatigue machines and a Sonntag SF-10R machine. The Moore machines use cylindrical specimens 0.3 in. diam at the stressed section, and the SF-10R specimens were 0.9 in. diam at the stressed section.

The smaller-sectioned bars were heat treated by oil quenching and tempering to obtain a hardness of 62 to 66 Rc. The larger bars were treated to a hardness of 58 to 64 Rc. Martempering treatment was also used on the smaller test bars. The endurance limits of both the molybdenum steel (heat 33471) and a chromium steel were determined at 20 million cycles of stress reversal. Data obtained are tabulated in the accompanying box. Since there was no significant difference between results from both the machines, the data are combined.

Several separate studies were made on the stabilization of austenite as affected by elapsed time between removal from the quenching oil at 120°F and the subzero treatment, and also the stabilizing effect of tempering at 325°F before applying subzero treatment. The effect of stabilization of the austenite on quenching by delaying the cooling to —120°F or prior tempering nullifies to a great extent the transformation of austenite to martensite during subsequent cooling.

About 450 outer race rings were upset-forged from 3-in. rounds of heat 33471, annealed and machined. The rings were about 4 in. diam with a wall thickness of a little over ⅜ in. Hardness of the as-forged rings ranged from 98 to 109 Rb. The rings were run through the annealing cycle used for AISI E-52100 race forgings. A typical microstructure is shown in Fig. 6, both with the light and electron microscopes; the latter enables an exact measure of the volume of carbides present, and also of the size distribution.

The annealed structure is not as uniform with respect to carbide size and shape as is usually observed with annealed chromium steel. Whether this is typical of the analysis or of the particular experimental heat has not as yet been determined. It is most likely that the annealing cycle for 52100 is not the best for the molybdenum steel. The annealed structure contained some coarse pearlite areas, which in the case of chromium steel is undesirable from a machining standpoint. However, the molybdenum steel had a range of 87 to 89.5 Rb and machined without difficulty.

Annealing of Mo Steel Shorter

The annealing cycle which would eliminate pearlite remains to be worked out for the molybdenum steel. Preliminary tests indicate that a time cycle of 20 hr would suffice for a 5000-lb furnace load, and should be at least 50 pct shorter than presently used for the 52100 steel.

FIG. 9—Electron micrographs of heat-treated molybdenum races. Etched with 1 pct Nital + 1 pct zephraian chloride, chromium shadowed, 21,500X. Oil quenched and tempered, left, the martempered and tempered sample is shown at the right.

ENDURANCE LIMITS OF MOLY AND CHROME STEELS

	Molybdenum steel	*Chromium steel*
HEAT TREATMENTS		
0.3 INCH SPECIMENS		
	Austenitized for 8 Minutes in salt at 1500°F and quenched in oil (130°F). Tempered at 325°F for one hour or austenitized for 15 minutes in salt at 1525°F, quenched in salt at 425°F for 2 minutes and air cooled for 2 hours and tempered at 322°F for one hour.	Austenitized for 15 Minutes in salt at 1550°F and quenched in oil (130°F). Tempered at 325°F for one hour or austenitized for 20 minutes in salt at 1575°F, quenched in salt at 425°F for 2 minutes and air cooled for 2 hours and tempered at 325°F for one hour.
0.9 INCH SPECIMENS		
	The treatment was the same as above except that the austenitizing time was 30 minutes. These received no martempering treatment.	The treatment was the same as above except that the austenitizing temperature was 1550°F and the time was 60 minutes. These received no martempering treatment.
ENDURANCE LIMITS p.s.i.		
Oil Quenched (0.3" & 0.9" Specimens):	113,000 to 115,000	100,000 to 109,000
Martempered (0.3" Specimens):	100,000 to 115,000	100,000 to 115,000

About half of the 450 machined race rings were hardened by the conventional oil quench treatment and the other half were Martempered. In each case, the austenitizing time cycle was cut in half. The treatment applied to 52100 steel rings of the same size is to heat in a continuous atmosphere controlled furnace at 1525°F for about 30 min and quench in oil (120° to 130°F), followed by tempering at 325°F for 90 min in the continuous tempering furnace.

The molybdenum steel rings were austenitized for 17 min. The Martempering treatment for the same size 52100 rings is to heat in salt for 20 min at 1570°F and transfer to a salt bath at 425°F for 2 min followed by air-cooling. The molybdenum steel rings were austenitized in salt for 10 min; the rings were then tempered for 90 min at 325°F.

Hardness of the 0.5 pct Mo steel rings was checked and compared with the hardness of oil-quenched and tempered and Martempered and tempered AISI E-52100 steel rings. The molybdenum steel rings were slightly harder than the chromium steel rings after comparable heat treatment, except in the case of the Martempered rings as shown in Fig. 7.

The microstructure of oil quenched and Martempered molybdenum steel rings after tempering is shown in Fig. 8, and Fig. 9 shows electron micrographs of the same specimens. The oil-quenched and tempered ring contained 16.5 pct austenite while the Martempered and tempered ring showed 26.7 pct austenite. The triangular patches seen in Fig. 9 are austenite. Fig. 10 compares tempered hardness of both types of steel with various austenitizing temperatures.

The distortion in heat treatment of the rings was determined by taking OD out-of-round measurements before and after heat treatment. The data obtained indicate that no greater distortion would be experienced with the molybdenum steel than obtained with the chromium grade.

References

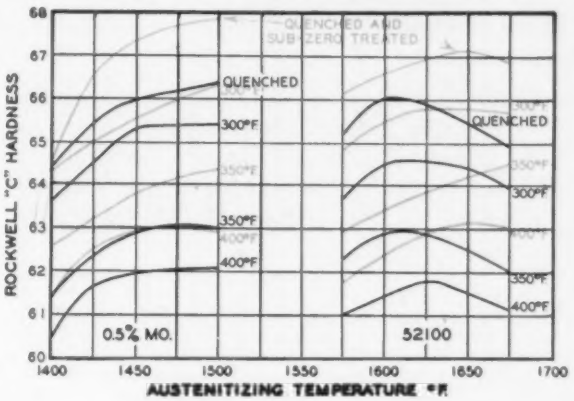
[1] *G. E. Seil, "Chrome Ore, Its Conservation and Substitution," WPB Advisory Committee on Metals & Minerals, Metal Progress, 1942.*

[2] *A. S. Jameson, "Metallurgical Aspects of Ball Bearing Steels," THE IRON AGE, Sept. 2, 9, 16, 1948.*

[3] *A. L. Ellis and F. K. Iverson, Unpublished Research at Mfg. Research, International Harvester Co., 1950.*

[4] *B. L. Averbach and M. Cohen, "X-ray Determination of Retained Austenite By Integrated Intensities," AIME Technical Publication 2342, February, 1948.*

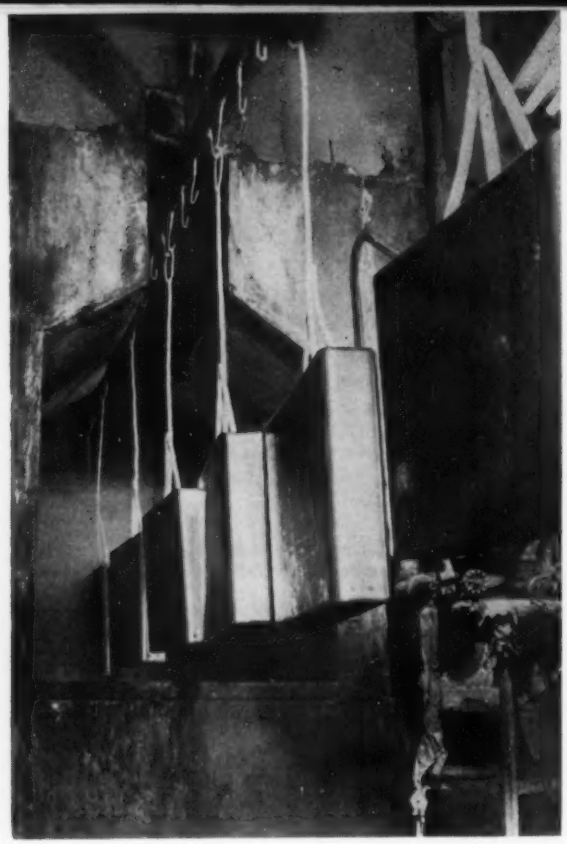
FIG. 10—The effect of austenitizing temperature on tempered hardness of chromium and molybdenum steels. Time at tempering temperature was 1 hr. Results on samples which were given subzero treatment are shown in color.



NEW BOOKS

Production Planning and Control, by T. M. Landy, outlines the fundamental principles and laws for more economical and smoother functioning of a production planning and control system, and how to devise and install a new one. Emphasis is placed on the scientific rather than the usual case-method approach. McGraw-Hill Book Co., 330 W. 42nd St., New York 18. $5.50. 436 p.

Canadian Trade Index, annual issue of 1950. This edition includes a thoroughly revised mailing list of approx 10,000 Canadian manufacturers with addresses, branches, principal products, export representation, trade marks and brands. Newfoundland manufacturers are also listed. Canadian Manufacturers' Assn., Inc., 1404 Montreal Trust Bldg., Toronto 1, Canada. $7.50. 1086 p.



SHEET METAL ironer legs entering the three-stage washer at the plant of Ironrite, Inc., where a new type phosphating cleaner is utilized.

Phosphating cleaner cuts finishing costs

A new type of phosphating cleaner has enabled Ironrite, Inc., Mt. Clemens, Mich., to reduce paint failures on it Ironrite Ironer to a minimum. The cleaner cleans metal, and deposits a phosphate coating at the same time. The coating retards rust and provides a bond for industrial finishes.

The cleaner, Klem Kote, is used in a 3-stage washer. After cleaning and coating with Klem Kote, metal is given a hot water rinse, and finally rinsed with Tacomite chromic-phosphric rinse. Temperature is between 170° and 180° F. The coating-cleaning compound is used in a concentration of 1 to 2 oz per gal of water.

Normally, the washing process requires about 1 min, but when surface rust is apparent Ironrite increases time to 4 to 5 min. After this time rust spots may still be visible, but Ironrite's experience indicates that they have been passivated.

Ironrite is using about half as much Klem Kote as of the chemical used in their former, more complex rustproofing process. Since Ironrite processes over 5000 painted pieces per day, savings have been substantial.

Can aid standardization of radio sensitivity

Development of an extremely simple, radio-frequency micropotentiometer by M. C. Selby, of the National Bureau of Standards, appears to have removed most of the obstacles to standardization of radio receiver sensitivity. The new unit is the first low impendance device producing accurate r-f voltages in the microvolt range without the use of attenuators. A wide frequency range extends past 300 mc.

Equipment and shielding problems encountered in the calibration of present-day commercial voltage generators, attenuators, voltmeters and other such radio-frequency apparatus should be greatly reduced. The new instruments consist mainly of appropriately housed and mounted current-carrying elements. These are annular membranes (either metallic or nonmetallic) of various radii, thicknesses and electrical resistivities, together with means of monitoring the currents they carry. Electrical constants are determined simply by using known dc voltages and currents.

These micropotentiometers may be used for direct calibration of percentage-modulation indicators. By means of known voltage ratios they can extend the range for checking attenuators up to 120 db or higher. Simplicity of operation, trouble-free circuitry, flexibility and absence of serious shielding problems make these instruments particularly adaptable to use by semi-trained personnel. Verification of the exact frequency and voltage ranges of the micropotentiometers in relation to other independent standards is still in progress at the Bureau of Standards, along with other work on design and application.

By R. D. Thomas, Jr.
Vice President and Director of Research and Engineering
Arcos Corp., Philadelphia

tantalum

PARTLY REPLACES COLUMBIUM CONTENT OF ELECTRODES

Tantalum, when used to replace part of the usual columbium content in stabilized Type 347 arc welding electrodes, produced no significant differences in several types of tests. These tests included evaluation of tensile and stress-rupture properties (conducted at both room and elevated temperatures), resistance to accelerated corrosion and crack sensitivity.

For many years, the welding electrode industry has been manufacturing 19 Cr, Ni, 1 Cb (Type 347) electrodes by applying a columbium bearing coating to a 20 Cr, 10 Ni (Type 308) core wire. Ferrocolumbium containing about 55 pct Cb, 5 pct Ta and 40 pct Fe has been the source of the columbium and recoveries of 50 to 75 pct have been obtained, depending on other coating ingredients.

Due to the critical shortage of columbium, a new type of ferro-alloy containing about 40 pct Cb, 20 pct Ta and 40 pct Fe is now being produced. Tantalum recovery is about 70 pct that of columbium, so approximately 8 pct more ferro-tantalum-columbium than ferrocolumbium would be required to produce a weld with the same columbium-plus-tantalum content.

Since tantalum has almost twice the atomic weight of columbium and forms the same type of carbide, it is reasonable to assume that more tantalum would be required to replace an equal amount of columbium to produce the same stabilizing or strengthening effect.

Due to difficulties in analysis and doubtful accuracy of routine chemical procedures, columbium and tantalum are usually reported as "Cb + Ta", computed from the weight of the combined oxides by employing the columbium factor. The small error that results counterbalances to some extent the error in the assumption that tantalum is as effective as columbium on a weight basis. After considering all the theoretical factors and difficulties involved, one is inclined to favor the expedient method of specifying columbium-plus-tantalum as determined from the basic oxides.

Various Analyses Tested

To find out what the effects of varying amounts of tantalum in Type 347 weld metal would be, three levels of columbium-plus-tantalum were chosen for each of two groups of electrodes. One was prepared from standard ferrocolumbium and one from ferrotantalum-columbium. In addition, two electrodes containing no stabilizing elements were included, one with the normal carbon content and one with the extra-low carbon type of core wire. The accompanying table gives the pertinent chemical analyses.

The results of room temperature tests on all-weld metal specimens prepared according to the standard procedures of the American Welding Society are shown in Fig. 1. These results were obtained from the highest columbium and colum-

A new Type 347 welding electrode coating that conserves columbium provides about the same tensile and stress rupture properties, corrosion resistance and crack sensitivity. However, both columbium and tantalum are in short supply and Type 308 electrodes can often be substituted for both old and new stabilized types.

CHEMICAL COMPOSITIONS

No.	Type	C	Mn	Si	S	P	Cr	Ni	Cb	Ta	Mo	N
		Core Wire Analyses, Pct										
W6801	308 wire	0.063	1.75	0.42	0.009	0.021	20.70	10.05	.....	.....	0.03	0.069
W6818	308 electric wire	0.028	1.70	0.12	0.014	0.017	20.58	10.24	.....	.....	0.08	0.050
		* Weld Metal Analyses, Pct										
6801	308	0.070	1.67	0.48	0.008	0.019	20.19	10.11	.....	.....	0.0	0.051
6802	347 (Cb = 6 × C)	0.068	1.60	0.41	0.012	0.013	20.2	10.25	0.39	0.06	0.06	0.062
6803	347 (Cb = 10 × C)	0.070	1.59	0.50	0.011	0.016	20.07	10.25	0.67	0.09	0.07	0.050
6804	347 (Cb = 15 × C)	0.069	1.61	0.55	0.0 0	0.017	19.96	10.25	0.95	0.13	0.03	0.064
6805	347Ta (Cb + Ta = 8 × C)	0.069	1.83	0.44	0.009	0.015	20.14	10.33	0.42	0.13	0.05	0.059
6806	347Ta (Cb + Ta = 12 × C)	0.069	1.72	0.51	0.013	0.018	20.07	10.25	0.68	0.20	0.06	0.057
6807	347Ta (Cb + Ta = 18 × C)	0.067	1.98	0.61	0.010	0.018	19.83	10.11	0.96	0.29	0.05	0.040
6818	308 electric	0.032	0.89	0.01	0.009	0.019	19.13	10.67	.....	.....	0.09	0.050

The writer wishes to acknowledge the assistance of his associates, H. C. Campbell, R. P. Wentworth and A. A. Bradd. In addition, he also acknowledges the cooperation of the Engineering and Research Laboratory of E. I. du Pont de Nemours & Co., Inc., in obtaining corrosion data and the help of International Nickel Co., Inc., in obtaining stress-rupture data.

Ta replaces Cb (continued)

bium-plus-tantalum samples so that any effect due to tantalum would be accentuated. The results are almost identical.

The results of stress-rupture tests at 1200°F are shown in Fig. 2. Too few tests were made to draw any definite conclusions about the influence of tantalum in the amounts encountered. The slight difference that did exist favored the 19-9 columbium electrode, except in the short-time tensile test. However, all the stress-rupture values range well above published figures for wrought material.

Corrosion tests showed that tantalum had no effect on the corrosion rates of all-weld metal specimens. The corroding media used in the tests were boiling 65 pct nitric acid (average of five 48-hr. periods), boiling copper sulfate acidified with sulfuric acid (average rate for 500 hr) (Strauss test) 3 pct hydrofluoric-10 pct nitric acids (average of four 1-hr periods at 163°F). Figs. 3 and 4 show the results obtained in the as-welded condition and after stress relieving, stabilizing, annealing and annealing-plus-sensitizing heat treatments.

Since the carbon content of the columbium and columbium-tantalum stabilized alloys ranged from 0.067 to 0.070 pct, the curves can be used to determine the minimum ratio of columbium-plus-tantalum to carbon needed to produce maximum corrosion resistance. The results obtained indicate that a ratio of 10 can be considered adequate. Lower ratios are likely to give higher corrosion rates, especially if the material is in the sensitized condition.

The composition of the weld metal resulted in a ferrite content in the range normally considered safe with respect to cracks and fissures.

FIG. 1—Results of room temperature tensile tests on 19-9 columbium and 19-9 columbium-tantalum weld metal specimens. One sample of each composition, as welded, was tested in the following conditions: 4 hr at 1300°F, air cool; 4 hr at 1550°F, air cool.

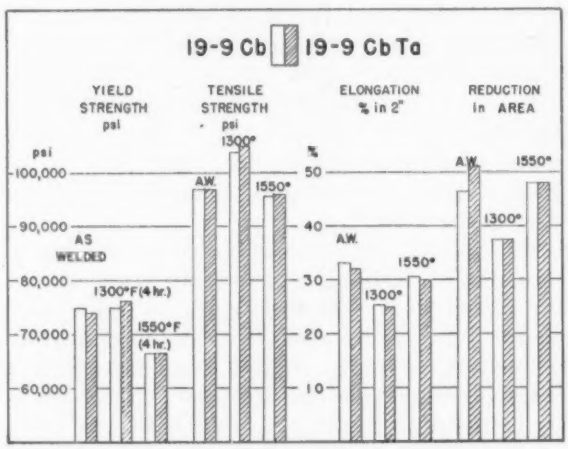
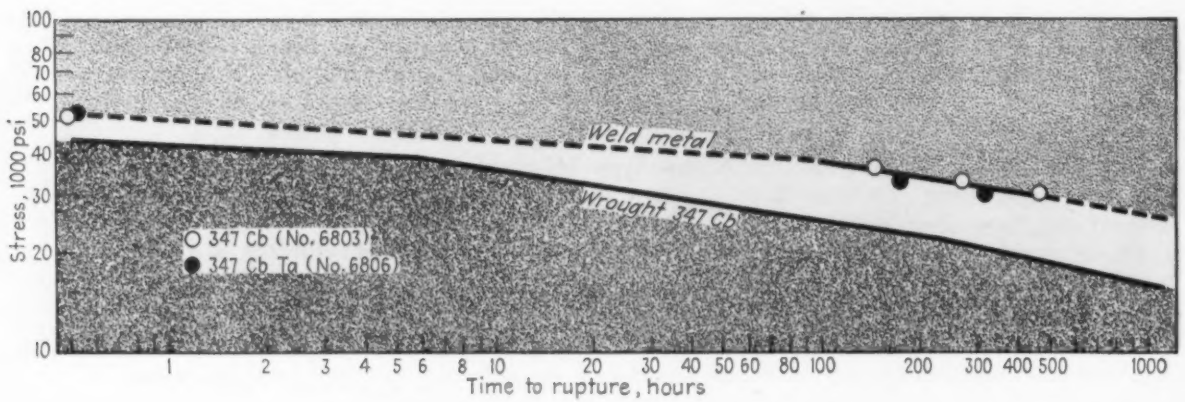


FIG. 2—Results of stress-rupture tests at 1200°F. Results of tests on wrought Type 347 at the same temperature are shown for comparison. (Curve for wrought Type 347 derived from "Digest of Steels for High Temperature Service," Timken Roller Bearing Co., Steel and Tube Div., 1945.)



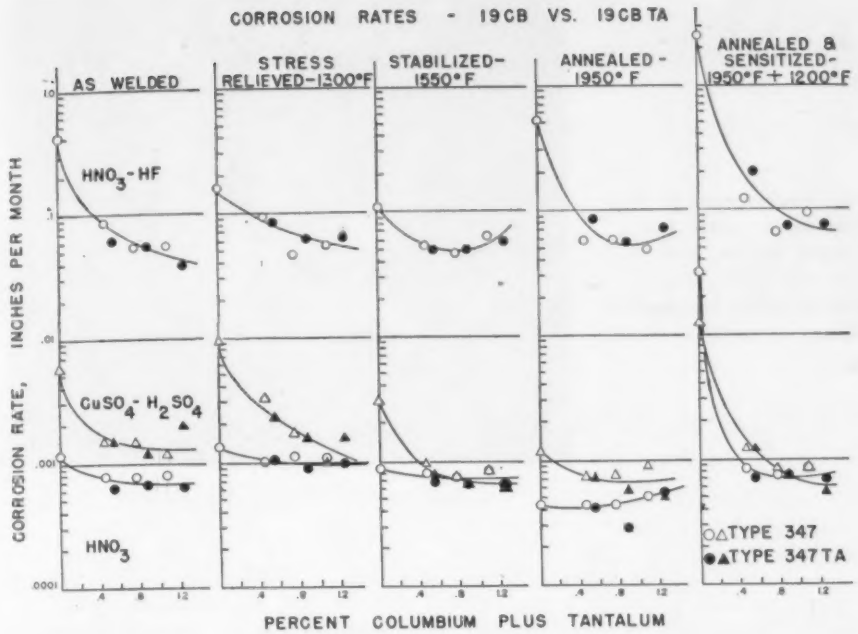


FIG. 3—Results of accelerated corrosion tests on weld metal specimens from Type 347 and Type 347 Ta electrodes.

Two segmented circular groove specimens in Type 347 plate were made with both the 19-9 columbium and 19-9 columbium-tantalum electrodes (Nos. 6803 and 6806). Neither showed the slightest evidence of cracks.

Experiments were also made in which the ferrite was varied by additions of nickel. Pairs of electrodes were prepared, one using ferrocolumbium and the other using ferrotantalum-columbium. The amount of fissuring found was identical with each pair of electrodes, dependent only upon ferrite content and independent of the amount of tantalum present.

This data was obtained in order to establish the interchangeability of Type 347 electrodes whether manufactured with standard ferrocolumbium or with ferrotantalum-columbium. At present, both these alloys are in critically short supply, making necessary drastic restrictions in their use.

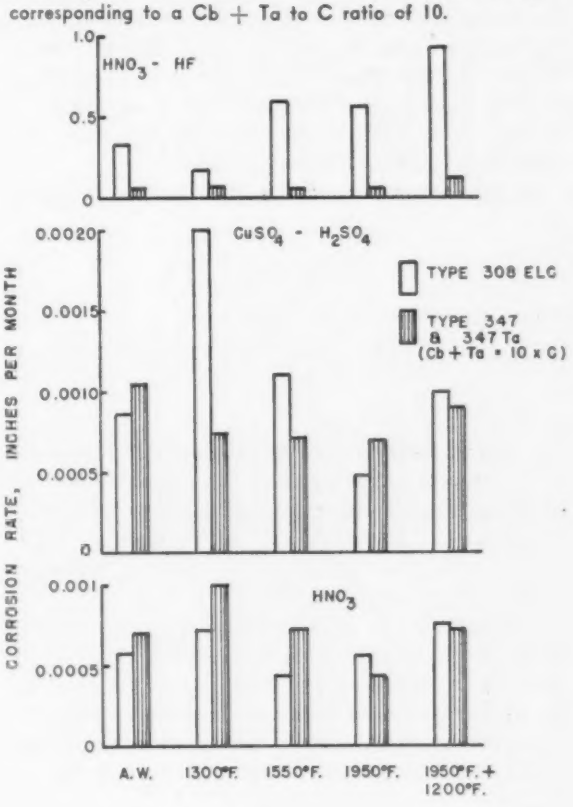
Recovery of Tantalum is Low

The rather low tantalum recovery in arc welding necessitates greater amounts of ferrotantalum-columbium than ferrocolumbium. This would make it seem preferable to allocate the latter material for welding electrode production. Nevertheless, it will probably be necessary to use the higher tantalum alloy in order to assure a continuous supply of electrodes for essential uses.

To conserve these much-needed critical alloys, metallurgists and engineers are urged to consider the specification of columbium bearing alloys carefully. There are many applications where standard Type 308 electrodes will perform as well as Type 347. In Fig. 3, the origin on the Cb+Ta scale represents the standard Type 308 weld metal. In certain media and under certain post heat treatments, its performance is as good or almost as good as Type 347.

While extra-low carbon Type 308 has an even wider field of applicability based on the corrosion tests, it is unlikely that such wire can be produced for anything but essential uses. Even if available, it should not be considered for welds where strength at elevated temperatures is required or in highly corrosive applications comparable to some of the test conditions reported above.

FIG. 4—Comparison of corrosion test results for extra low carbon Type 308 weld metal and stabilized weld metal. The latter represents the value taken from the curves in Fig. 3 corresponding to a Cb + Ta to C ratio of 10.



AUTOMATIC machine used in machining Studebaker water pump bodies. Special fixtures hold the intricately-shaped part, two of which are shown in the foreground, securely. Fixture at center is ready for loading.

Special fixtures hold part on automatic machine

Special fixtures aid the machining of intricately-shaped automobile water pump bodies at the Studebaker Corp. The large size and awkward shape of these parts can be seen in the accompanying figure, where two castings are shown, one before and the other after machining on a Bullard Mult-Au-Matic.

Before delivery to this machine, the pump bodies have three bosses milled. These are used in locating in the special fixtures on the six-station automatic machine.

In a fixture, the part rests on three hardened steel pins. At one end of the fixture is a spring-operated v-block in which one of the bosses is placed. At the same end, a clamp block with a beveled surface is tightened over a second boss on the part. This holds the part down on the three rest pins.

At the other end of the fixture is a serrated steel plate with a machined slot. This is moved into place against the part and tightened by means of a socket head screw which is threaded into a tapped hole in the fixture base. The serrations contact the workpiece and help hold it in place. An empty open fixture is shown in the illustration.

With the pump body thus securely held, loading is complete and the table indexes to the machining stations. At the second station, a 3.814 to 3.816-in. hole is rough and finish bored, and chamfered. At the next station, the cover hole is rough and finish faced. The impeller face is rough and finish machined at the fourth station. At the fifth station, four 0.257-in. holes are drilled. These are tapped at the sixth station. The fixture then returns to the first station, used for unloading and reloading. Average hourly production is 72 units.

New cutting torch uses gasoline as fuel

A recently-developed cutting torch burns gasoline and oxygen and is said to have several advantages over the oxyacetylene type of torch. It is claimed to bring an overall saving of 25 to 30 pct to such operations as cutting, brazing, scarfing, and similar work.

According to J. A. Browning, an instructor at Dartmouth College, who developed it, the torch can do as much work on 70¢ worth of gasoline as the oxyacetylene torch can perform on a 100-cu-ft tank of acetylene. Tests are said to show the torch makes a faster and cleaner cut under similar conditions than does an acetylene torch. Other advantages claimed are reduction in bulk and weight by elimination of large acetylene cylinders in favor of small gasoline cans, and a cutting head design which is said to lessen chances of backfiring and eliminates backflashing into the torch handle.

Basically, the new torch operates in the same manner as an acetylene torch. It blends liquid gasoline and oxygen, which is converted into vapor in the torch tip by the heat of the torch flame.

ALUMINUM—There's Little Left for Civilian Users

NPA's 60 pct DO set-aside plus stockpiling may take up to 80 pct of primary output . . . Fabricators found primary producers had already met old ceilings—*By Bob Hatschek.*

New York—A terrific hustle is shaping up in the aluminum procurement picture. Percentagewise, aluminum is in higher demand than steel for DO needs, a fact that was confirmed last week when National Production Authority increased the set-aside to 60 pct. (See box at right.)

What has been happening is that manufacturers with DO orders found that primary producers in many cases had already fulfilled their DO obligations. The fabricator was forced to obtain a directive from NPA ordering the producer to supply aluminum. Even with the 60 pct holdout, primary producers are expecting to receive directives above it.

May Take 90 Pct

Added to direct DO requirements are government programs and the national stockpile. Here again, the current rate of stockpiling has not been divulged by the government for "security" reasons. Last year, however, Washington stated a goal of 1.5 billion lb over a 5-year period. This breaks down to about 300 million lb per year, which figure has been mentioned previously by the Munitions Board.

The military have still not informed producers of their actual tonnage requirements but it was recently reported that the aircraft program is lagging behind authorized production.

With probable production for 1951 being in excess of 1.6 billion lb, this stockpiling adds another 15 to 20 pct to the 60 pct DO requirements. These, coupled with other government programs, may consume up to 80 or possibly 90 pct of the total primary production of this country by the third or fourth quarter, according to one informed source.

While the government will require this much aluminum, production of civilian goods is still permitted at 65 pct of base period. An amendment to order M-7 has delayed the ban on certain end-uses of the metal from Apr. 1 to May 1. NPA also removed conductors and accessories from the list and authorized (in order M-50) second quarter use of 49 million lb of aluminum by power companies.

All facets of the situation contribute to a worsening procurement headache for producers who are not on either direct or indirect defense work. And those who want to get into war work claim that sudden and drastic cuts are causing a loss of skilled labor which will hinder them later.

Imports, which do not come under NPA restrictions, will be one source supplementing the meager leftovers of the defense program and another will be the higher-priced secondary metal. The latter will be a bit easier to procure because manufacturers will try to specify the cheaper primary aluminum in DO orders.

All reactivated facilities in the

Turn Page

More for Defense

Washington — National Production Authority last week amended order M-5 to increase the amount of aluminum set aside for DO-rated orders. The new schedule requires producers and fabricators to reserve 60 pct of their production, up 15 pct, and distributors and jobbers to reserve 45 pct of their supplies, a 20 pct increase.

Effective Apr. 1, producers and fabricators are required to accept DO orders as follows: Sheet (coiled and flat), plate, circles and blanks, 55 pct; extrusions and tubing, 60 pct; rolled shapes, 45 pct; rod, bar, wire and cable, 50 pct; forgings and pressings, 75 pct; castings, 55 pct; secondary ingots, 60 pct; and all other mill products, 55 pct each.

Hike Structural, Piling Ceilings

Washington — Steel producers have been notified by the National Production Authority to increase required percentage reserves of heavy carbon structural shapes from 20 pct to 30 pct, and carbon steel piling from 15 pct to 30 pct. For the first time, producers must also set aside 5 pct of their cold-rolled alloy strip.

Canadian Ships to Haul Ore Again

Washington—President Truman has signed the bill authorizing vessels of Canadian registry to transport iron ore between U. S. Ports on the Great Lakes until Dec. 31. This working agreement has been renewed every year since World War II.

INDUSTRIAL SHORTS

Office Opened—A sales office located at 120 E. Third St., Charlotte, N. C., has been opened by CUTLER-HAMMER, INC., pioneer electrical manufacturers of Milwaukee.

Distributor — The Globe Steel Tubes Co., has appointed A. B. MURRAY CO., INC., distributors of their complete line of seamless steel welding fittings.

New Corporation—BRONZE BEARINGS, INC., Cranford, N. J., has been recently organized to take over the manufacture and sale of bronze bearings, bushings, graphited oilless bearings, and non-ferrous castings formerly produced by S & H Bearing Mfg. Co.

New Prexy—W. M. Holland, manager of manufacturer sales, Industrial Power Div., of International Harvester Co., was elected president of the INTERNAL COMBUSTION ENGINE INSTITUTE.

Ammunition Job—A $25 million contract for artillery ammunition has been awarded the CHEVROLET MOTOR DIVISION. Reactivation of facilities in three buildings at the North end of the St. Louis Ordnance Plant will begin immediately.

Hanna Celebrates—HANNA ENGINEERING WORKS, Chicago manufacturer of hydraulic and pneumatic cylinders, valves and riveters, is celebrating its fiftieth anniversary this year.

Moves In—A new factory which combines increased floor space with additional machine shop facilities was opened recently by the HI-SHEAR RIVET TOOL CO., and is located at 8924 Bellanca Avenue, Los Angeles.

FRA Directory—A new directory of motion pictures and slidefilms for industry executives has been prepared by FILM RESEARCH ASSOCIATES, New York. This "Film Guide on Production and Management Methods" furnishes details on more than 150 films from 61 indicated sources.

Consolidated—All west coast activities of the A. O. SMITH CORP., have been consolidated into a Pacific coast division and will be located in Los Angeles.

Larger Quarters — WILLIAM FROST CO., INC., brokers in iron, steel and metals have moved their offices to larger quarters at 436 Hudson Terminal Building, 30 Church St., N. Y.

Contract Awards — Contracts totalling over $14 million for the construction of two blast furnaces has been awarded JOHN MOHR & SONS, Chicago. One will be built at Portsmouth, Ohio, for Detroit Steel Corp., the other at Midland, Pa., for the Crucible Steel Co. of America.

Site Leased—GENERAL RADIATOR CO., Sturtevant, Wis., has leased 35,000 sq ft of space from the government at Marion, Ill., on the site of World War II Illinois Ordnance Works, for the production of industrial engine coolers.

Expansion—Completion of an additional 20,000 sq ft floor space for the manufacture of powder metal parts and negative temperature coefficient resistors, was announced by KEYSTONE CARBON CO., St. Mary's, Pa.

New Headquarters—Headquarters of the coal chemical sales division of U. S. STEEL CO. has been established at 525 William Penn Place Bldg., Pittsburgh.

Plant Planned—Air Reduction Co., Inc., will construct a plant, costing upwards of $10,000,000 at Calvert City, Ky. It is to be operated by NATIONAL CARBIDE CO., a division of Air Reduction.

Obtains Patent—A patent relating to heating apparatus for melting or treating metal has been issued to Harry Dobrin and assigned to FURNACE ENGINEERS, INC., Pittsburgh. The development is particularly applicable to galvanizing settings.

country will be in full production this year but the majority of new plants will not begin to operate until the end of 1951 or the beginning of 1952. Aluminum Co. of America hopes to start production of the new Point Comfort, Tex., facilities by Jan. 1952 but has not yet reached a decision on the location of the new reduction plant.

Reynolds Metals Co. has the same date in mind for its Corpus Christie smelter and is expecting to get some metal from the expansion at Jones Mills, Ark., by this June or July. Kaiser Aluminum & Chemical Co.'s new smelter in New Orleans is also scheduled to start producing at about the end of this year. Peak output may be expected from all these plants sometime about mid-1952.

Armour Research Develops New Hot-Dip Tallow for Tinplate

Tinplaters see it as an emergency substitute for imported palm oil.

Pittsburgh—Development of a specially-processed tallow for use in the processing of hot-dip tinplate provides this country with its first domestic substitute for palm oil and could be used in an emergency should foreign sources of palm oil be cut off.

Tinplate producers consider the development strictly an emergency one, however, and expressed doubt that the tallow will gain widespread use as long as palm oil is available.

Hardship on Workers

One authority pointed out that the tallow, developed at Armour Research Foundation of Illinois Institute of Technology on a project sponsored by American Iron & Steel Institute and produced by a commercial fat processor, would hardly be able to compete on a cost basis with palm oil.

It was also stated that, while the new material performed fairly satisfactory in mill tests, the mills might not be interested in pushing its use for another reason—the men who work on the hot-dip pot lines are accustomed

to using palm oil and it is a difficult job to swing them over to an unfamiliar material. The mill tests were conducted by Weirton Steel, Jones & Laughlin, and Inland Steel.

From an emergency standpoint, the development is fairly important. Up to this time there had been no domestic substitute for palm oil, which comes principally from Sumatra and the Belgian Congo.

About 7000 tons of palm oil are used annually for hot-dip tinning. Costs have been high and unstable, and in time of war it is feared enemy action could disrupt supply lines.

Very little palm oil is used in the production of electrolytic tinplate, which last year accounted for slightly more than 60 pct of tinplate shipments. Hot dip has steadily been losing ground to electrolytic since the war.

Basic Metals CMP on Brink of Announcement

Mobilization chief Wilson presents it to White House . . . Wrinkles were to be ironed out this week . . . Effective date will be end of June, effects come later—*By Karl Rannells.*

Washington—A "form of controlled materials plan" for basic metals was ready to be announced at press time, perhaps this week, Defense Mobilization Director Wilson reported to the White House last Monday.

Still to be ironed out at final conferences scheduled for the first part of the week were: (1) Which metals should be included in CMP and (2) how far CMP controls over allocations for end uses should be extended. The program is scheduled to become effective at the end of June but definite results are not expected before last quarter 1951.

Halt at 20 Pct

Full effects of the defense program will not be felt until late this year and early in 1952. Although some $23 billion has been obligated since last June and defense orders are now at the $1 billion a week rate, much of the 9 months has been required for tooling up and conversion.

Finished goods are beginning to roll from the lines in quantity and the demand for raw materials for defense will be greatly stepped up over the coming months. Now taking only 8 pct of total national production, the defense program will require 15 pct in late 1951, and eventually 20 pct—and no more.

Steel, copper, and aluminum are currently the three biggest bottlenecks, the report stated. Defense requirements presently are taking 12 pct of steel, based on first quarter tonnage. But this will be hiked to an overall rate of 20 pct before the end of the year (the defense take of some specific types will amount to 50 pct or more).

More than 75 pct of the defense orders being placed are for aircraft, tanks, combat and other automotive vehicles, ammunition, guns and other military type goods which require large amounts of steel.

All estimates include requirements for assistance to other nations under the Atlantic military pact—of which some 1,000,000 tons have been delivered. Already transferred or at the shipping stage are 3500 tanks and combat vehicles, 11,000 general purpose vehicles, 750 aircraft, 3000 pieces of major artillery, and thousands of tons of ammunition and other equipment.

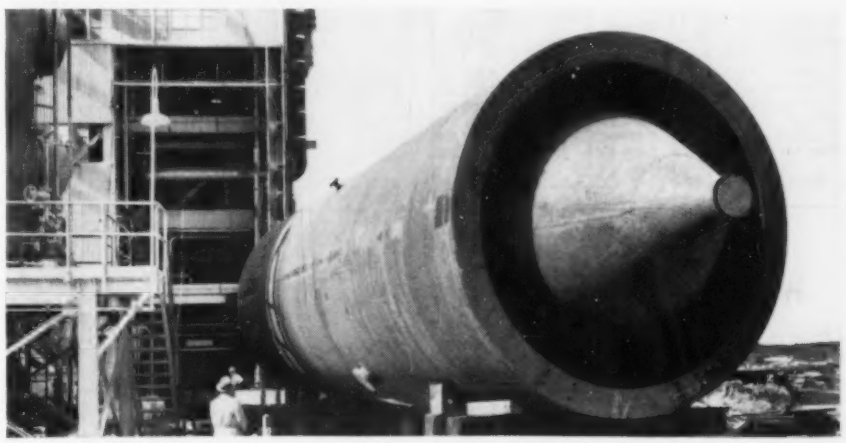
Guns and Butter

Defense needs are taking 12 pct of current copper supplies and this will also rise to about 20 pct by the end of this year with little relief in sight. About 25 pct of current aluminum output is needed but this figure is expected to fall after this year with expanded production.

By 1953, the report forecast, the pressure will ease. The nation's productive capacity is then expected to be able to meet defense needs and also supply civilian type goods at a rate equalling or exceeding the pre-Korean level.

This prediction is based on assumption that present industrial expansion plans will boost the national production rate by $15 billions a year to a total annual rate of $345 billions.

High hope was held out in the report for getting bigger amounts of copper, zinc, lead, cobalt, tungsten, molybdenum, manganese and nickel from foreign sources. An International Materials Conference has been created with representation from 21 nations. It will try to get more of these materials produced—and distributed where they are most needed for the mutual defense effort.



STEEL STOMACH: Huge 65-ton wood chip digester waits installation at the San Joaquin Div. Plant of Fibreboard Products, Inc. Built by South San Francisco Plant of Consolidated Western Steel Corp., the 45-ft digester is assembled from welded steel plate.

Steel to Have Enough Raw Materials for the "Long Pull"

Cleveland—Although it may be nagged by temporary shortages of raw materials, the expanded 120 million-ton steel industry of early 1953 will "for the long pull" have provided for enough iron ore, coal, and other materials to make complete use of all its capacity if needed, said Tom C. Campbell, editor of THE IRON AGE.

He spoke this week before the Blast Furnace, Coke Oven and Raw Materials Committee and the National Open Hearth Committee of the American Institute of Mining and Metallurgical Engineers.

Mr. Campbell said steel will meet defense and essential civilian needs, and the coming heavy drain on the Mesabi field for iron ore will be "cut drastically by 1956 or 1957." He continued that Mesabi reserves can be extended for 60 years or more with support of foreign ore and taconite beneficiation. An annual total of 37 million tons of ore by 1956 or '57 which is not available today and an estimated 10 million tons of beneficiated taconite by 1960 will uncloud the ore picture.

Mr. Campbell said frozen scrap prices may have to be liberalized to stimulate collections, and the industry is expanding coking coal supplies for the greater need.

He concluded on a note of optimism, saying the "mammoth capacity of the latter fifties will be utilized" but 100 pct of capacity operations could not be expected forever.

High Farm Equipment Output To Depend on U.S. Materials Aid

Chicago—Sales of Oliver Corp., farm equipment manufacturer, will be cut down considerably during the second half of the year unless the industry receives government help in obtaining materials, said A. W. Phelps, board chairman. (THE IRON AGE, Mar. 1, 1951, p. 121.)

The company is now selling everything it manufactures and is still importing steel to maintain high production, he stated. Imports are expected to tighten up and production will depend a great deal on government assistance. During the 4 months to the end of last February, Oliver's sales were up 22 pct over the corresponding period the year before.

February Iron & Steel Production by Districts

As Reported to American Iron & Steel Institute

BLAST FURNACE —NET TONS DISTRICTS	Number of Companies	Annual Capacity	PIG IRON Feb.	PIG IRON Year to Date	SPIEGEL, FERRO-MANGANESE Feb.	SPIEGEL, FERRO-MANGANESE Year to Date	TOTAL Feb.	TOTAL Year to Date	Pct of Capacity Feb.	Pct of Capacity To Date
Eastern	12	13,870,680	1,060,137	2,230,165	25,211	52,433	1,085,348	2,282,598	102.0	101.8
Pitts.-Yngstn.	17	27,070,520	1,976,530	4,175,289	20,759	45,431	1,997,289	4,220,720	96.2	96.4
Cleve.-Detroit	6	7,110,600	421,352	1,003,387	.....	.....	421,352	1,003,387	77.2	87.3
Chicago	7	15,684,040	1,059,772	2,251,332	724	724	1,060,496	2,252,056	88.1	88.8
Southern	9	5,310,740	401,121	842,589	12,037	25,452	413,158	868,041	101.4	101.1
Western	4	3,425,200	198,691	443,935	.....	.....	198,691	443,935	75.6	80.2
Total	38	72,471,780	5,117,603	10,946,697	58,731	124,040	5,176,334	11,070,737	93.1	94.5

STEEL —NET TONS DISTRICTS	Number of Companies	Annual Capacity	TOTAL STEEL (Incl. Alloy Steel, Carbon Ingots) Feb.	TOTAL STEEL Year to Date	Pct of Capacity Feb.	Pct of Capacity To Date	ALLOY STEEL* Feb.	ALLOY STEEL* Year to Date	CARBON INGOTS, Feb.	CARBON INGOTS, Year to Date
Eastern	25	20,823,230	1,585,690	3,324,278	99.3	98.7	119,198	252,235	298,521	610,492
Pitts.-Youngstn.	34	41,411,870	3,060,707	6,533,417	96.3	97.6	407,716	898,736	355,656	743,168
Cleve.-Detroit	8	9,601,940	643,059	1,480,082	87.3	95.3	50,139	107,012	76,487	187,990
Chicago	15	21,576,750	1,644,181	3,505,457	99.3	100.5	132,511	276,190	215,434	516,489
Southern	9	4,859,340	395,791	821,388	106.2	104.5	5,178	9,127	3,108	7,135
Western	11	5,956,520	436,273	944,266	95.5	98.0	10,995	19,653	28,687	59,641
Total	81	104,229,650	7,765,701	16,608,868	97.1	98.6	725,737	1,562,953	1,007,893	2,124,915

Dow Magnesium Mill to Have Annual Capacity of 30 Million Lb

Pittsburgh—Dow Chemical Co.'s magnesium alloy rolling mill at Madison, Ill., will have an initial annual capacity of more than 30 million lb of strip and plate, ranging in thickness from .010 in. to 1½ in. in widths up to 72 in.

As demand increases, production can be stepped up by arranging equipment to operate as a semi-continuous hot strip mill.

Mill equipment, to be provided by United Engineering and Foundry Co., will consist of an 84-in. 4-high reversing hot mill to serve both as a preliminary and intermediate breakdown unit; a second 84-in. 4-high mill as a warm and cold finishing stand, together with a 36-in. 4-high warm and cold mill. Heating and finishing equipment will also be installed.

The mills will be fed by continuously cast slabs up to 10 in. thick, 40 in. wide, weighing as much as 2000 lb.

The Austin Co., of Cleveland, will prepare the plant, built originally for American Car & Foundry Co., for installation of mill equipment. Production is scheduled to begin early next year.

Recall of Reserves Bleeds Industry of Skilled Manpower

Technical board to determine fate of technician reservists urged.

New York—Indiscriminate recall of reserves to active duty in the armed forces where these men cannot properly use their technical knowledge will dissipate and is dissipating an industrial manpower asset that is already short, wrote Carey H. Brown, chairman of Engineering Manpower Commission of Engineers Joint Council, in a letter to Gen. George C. Marshall, Secretary of Defense.

Mr. Brown recommended formation of a board composed of technical men, military and civilian, who would have final authority in calling technically trained workers to service. He pointed out that "about 25 pct of engineers

and scientists" are reserves and the majority of men in this group are in the eligible 25 to 33-year-old category. Removal of a large proportion of these skilled men will have a destructive effect on technology, he warned.

Mr. Brown declared that he had received reports from employers complaining that recall of reservists had been made "with little regard to the eventual effect on industrial mobilization." He said the men who make these recall decisions have "inadequate understanding" of the role of the technically trained man who is a reservist.

"This situation is critical," Mr. Brown continued. "Reservists are being called to duty continually. Those who have been granted a delay are being told that such delays are only temporary and will seldom be renewed."

Labor Pirating: How Will WSB Meet Problem?

Contract shops hurt as toolmakers seek better-paying jobs . . . Aircraft, auto companies high bidders . . . NTDMA says area wage rates are expected to help—*By Bill Olson.*

New York—Lack of a clear-cut wage policy supported by labor, industry and government, and geared to emergency production needs, is hobbling industry's switch from civilian to defense output.

Widespread reports of "pirating" among tool and die makers, faster labor turnover, and a critical shortage of engineers and 20-odd vital metalworking job classifications are hindering quick, efficient conversion and best use of semiskilled and unskilled workers.

Pirating among tool and die workers, the result of high demand, tight supply and incomplete wage policy coverage, hits hardest at contract tool shops who are outbid in the labor market by high-wage aircraft and auto industries.

Typical example is a Cincinnati tool company paying the going rate of $1.65 for toolmakers. An auto company now making defense materials in the area is offering $1.95 plus 5¢ every 60 days until $2.25 an hour is reached.

Some big companies, with wages frozen under escalator clause contracts can offer workers considerably more per hour than the small tool and die companies.

Most affected is the small city, with an already tight labor supply which suddenly finds a big, new plant sprouting up nearby. The newcomer, likely to be a high-wage industry, may get authority to offer more than the going wage on the supposition it will not be paying "fringe" benefits.

Existing shops, tied by a wage freeze, cannot meet the new competition. This starts a turnover cycle.

The toolmaker, by experience capable of considerable creative effort and able to supervise less skilled men, moves to a higher paying shop. Attracted by incentive payments he may even make more as a production worker.

Some pirating in reverse by small new shops, formed by toolmakers who break away from established concerns to start on their own, is feared if an adequate wage policy is not set by WSB.

GLORY GONE: Once sleek streamliners, 15 of them, are cut for scrap by Union Pacific R.R. at Omaha. The 15-year-old cars have already been replaced by new equipment.

Spokesmen for the National Tool & Die Mfrs. Assn., representing 425 of approximately 2500 contract tool and die shops, protest that many small shops may be stripped of their best men by the time the Wage Stabilization Board gets around to establishing area wage rates to replace present base period rates.

Recommended by the NTDMA are area rates for various jobs, maximum area hiring rates low enough to discourage migration and permission for contract shops to meet the higher rates.

A serious shortage of engineers exists. A year ago these men were being turned out faster than they could be absorbed by industry. This shortage may reach 40,000 by 1954. A large portion of young engineers are reservists who are vulnerable. Pratt & Whitney has estimated 75 of its test engineers may be called for service in the armed forces.

Other critically short labor fields include metallurgists, aircraft and engine mechanics, boilermakers, coremakers, die setters, electricians, instrument repairmen, loftsmen, machinists, molders, patternmakers, rollers for iron and steel, blacksmiths, hammersmiths, metal miners, electronic technicians, sawsmiths and draftsmen.

Increase in the hiring rate, increase in straight time earnings, extension of the average work week, all point to more future pressure on the labor supply.

Builds Swedish Steel Plant

Stockholm, Sweden — Domnarfvets Jernverks is now building a new Thomas steel plant with a capacity of over half a million tons a year. The plant will have three 25-ton converters operated by electric blowers and hydraulic tilting mechanisms. Layout and designs were made by John Miles & Partners, London.

BITS AND BRIEFS

By Bill Packard

Steel gray marketeer dropping his price ½¢ per lb after reading fine print in price freeze regulation. Now he's legal . . . Long-term scrap contracts may be insurance against persistent shortage . . . **B&O's new $5 million ore pier at Baltimore nearly ready to start handling foreign shipments. Pier is equipped with two unloading machines, each having rated capacity of 1500 tons per hr and sustained capacity of 1000 tons per hr** . . . Chemical Service of Baltimore greatly expanding output of canned water. Product normally for lifeboat and aircraft use, but armed forces and civilian defense boosting demand . . . **DO-97 fast becoming most familiar number in America—that's the number you use to certify your own material priority for maintenance, repair and operation. There'll be some changes made, dum dee** . . . A natural gas transmission company has signed a contract for large quantity of linepipe from Belgium . . . Ferry Cap & Set Screw's President H. D. North says his firm is preparing for big output of aircraft engine type studs which they made in large quantities during last war . . . **Getting so a lot of home hunters won't even go look at a new home unless it has two or more baths—Bet some of them used to let the sun heat their bath water in the backyard, just as we did** . . . Many people learning magnets are used in the darnedest places—television and radio, appliances, farm equipment, toys and many engine applications. There'll be fewer magnets for civilians because they are going to war in electronic equipment, and they must share their most scarce ingredient (cobalt) with jet engines . . . **We doubt there will be many drivers roaming the country without a spare tire, but if it should happen to us we hope we have good company. Which reminds us we hate to see government and auto makers inadvertently making hoarders look like wise owls** . . . New equipment catalog from England has photos showing women operating heavy machinery in a British steel mill—Is this a trend? . . . **Tennessee Valley Authority letting contract to Chas. T. Main, Inc., for one of biggest steam-electric plants in the world to be built on Ohio River near Paducah, Ky. Remember how TVA started?**

Gets Tank Armor Castings Order

Pittsburgh—A $2 million tank armor castings order has been given to the Castings Div. of the National Roll & Foundry Co., Avonmore, Pa., reports Robert Logie, newly-elected president. At the Defense Dept.'s request National, a World War II producer of tank armor castings, reconverted from civilian castings production.

January Zinc Output Rises

Washington—January output of domestic zinc mines was an average 1927 tons per day for a total of 59,726 tons as compared to 55,127 tons last December, reports the Bureau of Mines. January's daily rate was 8 pct over December and reached the highest point since April 1949.

"Maybe I can go away somewhere 'til the scandal dies down."

Steel Co. of Canada Plans 700,000 Tons New Steel Capacity

Hamilton, Canada — The Steel Co. of Canada, Ltd., will expand steelmaking capacity by 700,000 tons a year. Finishing and flat-rolling facilities at the plant here will be able to absorb the primary capacity increase and produce 50 pct more in finished products without expansion.

The firm's plate and hot strip mills built in 1941 and '45, respectively, and cold sheet and tinplate mills in 1948 were designed with an eye to growth.

Major elements of the $50 million expansion plans, on a 2-year timetable, include dock and storage facilities, new coke ovens, a new blast furnace with a daily capacity of 1400 tons, and four openhearths with a 700,000-ton capacity. Steelco will with the new project have spent $115 million for expansion over 13 years.

New coke ovens to feed the planned blast furnace are already under construction. Eighty-three new ovens will be installed but 30 will replace the old No. 2 battery.

Mauthe to Get McFarland Award

Youngstown, Ohio—J. L. Mauthe, president of Youngstown Sheet & Tube Co., will receive the 1951 David Ford McFarland Award for achievement in metallurgy, conferred annually since 1949 on metallurgical alumni of Pennsylvania State College.

The award will be made May 4 at a dinner meeting at State College, Pa., where Mr. Mauthe will speak on "Economics and Engineering for Production of Modern Steels." The Penn State chapter of ASM is sponsor.

Stock Offering Oversubscribed

Pittsburgh—A Jones & Laughlin Steel Corp. offering of 1 million shares of common stock at $25.25 per share, was oversubscribed. The proceeds will help retire $40 million of 2½ pct serial notes issued Feb. 1 in connection with the company's $200 million expansion and improvement program.

SUBCONTRACTORS:

CAN YOU MAKE IT?

New York—Pressure of production schedules on prime contractors and the need for small manufacturers to keep plant machinery turning profitably will increase in months to come.

One way to relieve this pressure is to expedite flow of subcontract work from prime contractors to competent manufacturers.

Prime contractors and potential subcontractors may ease the worries of harried expediters, and treasurers, by making use of **"Can You Make It?"** a new weekly feature of THE IRON AGE.

Send a picture or simple inked sketch of the part to be subcontracted, with the part number, approximate size, tolerances, material, machine work needed, quantity required and address to:

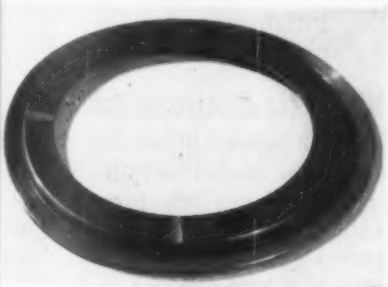
"CAN YOU MAKE IT?" EDITOR
THE IRON AGE
100 EAST 42ND STREET
NEW YORK 17, N. Y.

Small manufacturers interested in obtaining defense work are urged to contact directly the prime contractor.

For more information see THE IRON AGE, Mar. 22 p. 92 and Mar. 29 p. 111

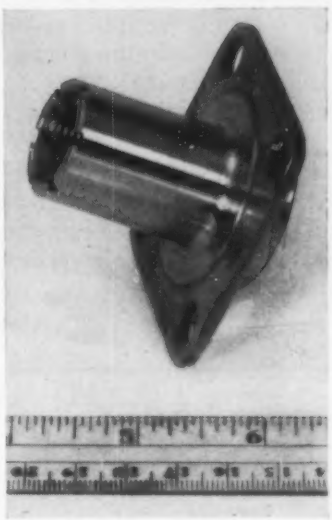
Iron Age SC 12 (above)

Machine from AMS 6260 forging.
Max. size: Approx. 7 in. by 4½ in.
Finish: 8-16-32 microinches
Carburized and hardened.
Core hardness Rockwell C32-40.
Case hardness Rockwell 30N77-80.
Tolerances: 0.001 in. to 0.010 in.
Requirements: 290 to 600 per month.
Part No. 133996, Subcontracting Dept., Wright Aeronautical Corp., Wood-Ridge, N. J.



Iron Age SC 13 (above)

Machine from AMS 6470 bar stock
Max. size: Approx. 7 in. by ¼ in.
Finish: 20 microinches.
Nitrided: Brinell on core 241-285.
Rockwell on case 15N92 Min.
Tolerances: Parallel within 0.0015 in.
Other dim. 0.004 in. to 0.010 in.
Requirements: 250 to 550 per month.
Part No. 137230, Subcontracting Dept., Wright Aeronautical Corp., Wood-Ridge, N. J.

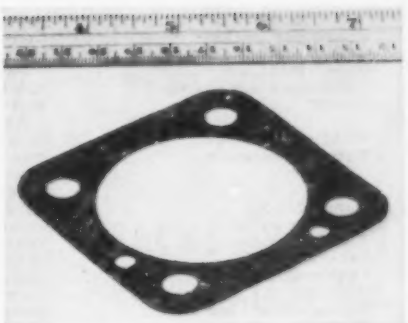


Iron Age SC 15 (above)

Machine from AMS 6260 forging.
Size: Approx. 2 in. x 1¾ in.
Hardness: Core, C32-40, carburized.
Case, 30N77-80, hardened.
Tolerances: 0.001 to 0.010 in.
Requirements: 5000 to 10,000 per month.
Part No.: 113430, Subcontracting Dept., Wright Aeronautical Corp., Wood-Ridge, N. J.

Iron Age SC 14 (above)

Machine from AMS-6470 forging.
Overall length: 7 in. by 1¼ in.
Nitrided on bearing surface, splines.
Brinell, core 241-285.
Rockwell, case 15N92 Min.
Finish: 8-16-32 microinches.
Tolerances: 0-001 in. to 0.010 in.
Requirements: 250 to 550 per month.
Part No. 126136, Subcontracting Dept., Wright Aeronautical Corp., Wood-Ridge, N. J.



Iron Age SC 16 (above)

Make from AMS 3231 composition.
Size: Approx. 3 in. x 3 in.
Tolerances: 0.007 to 0.020 in.
Requirements: 10,000 per month.
Part No.: 113340, Subcontracting Dept., Wright Aeronautical Corp., Wood-Ridge, N. J.

CONTROLS DIGEST

Industry Controls This Week:

NPA Orders

M-5, Aluminum supplies—Establishes larger reserves of supplies to meet DO orders, up 15 pct for producers or fabricators, and 20 pct for distributors. Effective Apr. 1.

M-7, Aluminum amendment—Postpones to May 1 the ban on use for List A articles. Permits acceptance of rated orders on some prohibited items. See p. 117.

M-8, Tin inventories—Revision cuts delays in replenishing tin and tin product inventories.

M-12, Copper use base—Amendment permits fabricators closed 15 consecutive days during first half of 1950 to omit that month in computing amounts used when figuring monthly average. Effective Mar. 14.

M-33, Molybdenum supplies — Amendment provides for allocation of metal, alloys and chemicals. Effective May 1.

M-38, Lead amendment—Manufacturers limited to rate of consumption in first half 1950. Stocks reduced to 30 days and DO reservation set at 20 pct.

M-45, Napthenic Acid—Allocates on end-use base at supplier level. Effective Mar. 31.

M-50, Aluminum use — Permits utility companies to use 49,000,000 lbs of aluminum for second quarter. Effective at once.

M-52, Molybdenum in stainless—Limits molybdenum content in stainless to 2.5 pct of weight.

M-54, Platinum use—Prohibits use in many items, mostly jewelry, and restricts inventories. Effective Mar. 31. See p. 154.

M-55, Farm equipment — Permits farm machinery manufacturers to extend DO's to obtain materials for June.

OPS Orders

CPR-14, 15, 16, Food markups—Sets markups permitted by wholesalers and large and small retailers for foods. Effective Apr. 5.

New Moly Order Hits Stainless

Washington — A new order, M-52, issued over the weekend, limits the molybdenum content of stainless steels to 2.5 pct by weight. It permits completion of production started as of Mar. 31.

Officials admitted the order, in effect, suspends production of AISI type 317 and will bring tighter control of molybdenum content in type 316.

Defense Contracts to Metalworking Industry

Selected Contracts, Week of Apr. 2, 1951

Item	Company
Steering motors	General Electric Co., Chicago
Propulsion motors	Continental Electric Co., Newark
Geared induction motors	Kollsman Instrument Corp., Elmhurst, N. Y.
Generators	Gleason Works, Rochester
Telescopes and parts	Baird Associate, Inc.
Pumps	Worthington Pump and Machinery Corp., Harrison, N. J.
Windlass, anchor	McKiernam-Terry Corp., New York
Motor generators	The Safety Car Heating & Lighting Co., Inc., New Haven, Conn.
Cranes	Westinghouse Air Brake, Peoria, Ill.
Dump trucks	Ford Motor Co., Washington
Snow plows	Frink Snow Plows, Clayton, N. Y.
Truck chassis	White Motor Co., Cleveland
Generators	General Electric Co., Washington
Tachometer	General Electric Co., Schenectady
Antenna	Lern Laboratories, Inc., New York
Accumulator ass'y.	Bendix Aviation Corp., North Hollywood, Calif.
Magneto ass'y.	Bendix Aviation Corp., Sidney, N. Y.
Diesel engines	Woodward Governor Co., Rockford, Ill.
Generators	Elliott Co., Ridgway, N. J.
Station wagon	Pontiac Motor Div., Detroit
Fan, exhaust	M & E Mfg. Co., Indianapolis
Truck	Ford Motor Co., Washington
Trucks, panel	Ford Motor Co., Washington
Trucks, hi-lift	International Harvester Co., Washington
Semi-trailer	Fruehauf Trailer Co., Detroit
Gears	Allis Chalmers Mfg. Co., Milwaukee
Valve	Imperial Brass Co., Chicago
Trucks	Airport Service Equipment Co., Inc., Mineola, N. Y.

NPA's Tentative Forms Seek Best Way to Get Steel to Defense

Washington — Members of NPA's Steel Forms and Reports Industry Advisory Committee have been given tentative copies of a steel producer's monthly production directive report. Purpose is to determine how available supplies of steel products can best be directed to defense mobilization.

The report would indicate tonnages to be produced and shipped and orders accepted from consumers under NPA directives. Now being considered are suggested forms for pig iron and shipments of steel to warehouses.

Members of the Industry Advisory Committee who discussed these reports were: Howard B. Johnson, Atlantic Steel Co., Atlanta, Ga.; A. M. Reed, Bethlehem Steel Corp., Bethlehem, Pa.; John Moxon, The Carpenter Steel Co., Reading, Pa.; Earl D. Page, Colorado Fuel & Iron Corp., Denver, Colo.; R. A. Yoder, Detroit Steel Corp., Detroit, Mich.; K. M. Cressler, Granite City Steel Co., Granite City, Ill.; L. M. Mathis, Isaacson Iron Works, Seattle, Wash.; Edw. L. Resler, Jones & Laughlin Steel Corp., Pittsburgh, Pa.; Stewart Huston, Lukens Steel Co., Coatesville, Pa.; W. B. N. Brookes, Republic Steel Corp., Cleveland, Ohio; H. C. Stringfield, U. S. Steel Co., Pittsburgh, Pa.

Nickel for Electronic Tubes

Washington—NPA will soon try to assure nickel supplies to electronic tube manufacturers so that substantial portions of their plants can be kept operating and skilled labor retained for a later contribution to defense.

Details of the coming order were not outlined beyond the disclosure that the industry will receive less nickel than in the last quarter of 1950 and that new production may have to be sacrificed to maintain output of replacement goods.

Molybdenum to Be Allocated By NPA on May 1; Stocks Limited

Washington—NPA will allocate all molybdenum supplies on May 1. A new amendment to order M-33 replaces NPA distribution by directive.

The amendment provides for monthly allocation of molybdenum, ferromolybdenum, molybdenum oxide (roasted molybdenum), calcium molybdate and other primary molybdenum alloys and chemicals on the basis of end-use.

Except for May, allocation applications must be filed not later than 45 days before the month in which delivery is sought. Allocation applications for May deliveries will be accepted through May 15.

Firms using not more than 200 lb monthly are exempted, except for deliveries of molybdenum metal powder, wire, rod or sheet, all subject to full allocation.

Ordering or accepting these products is prohibited when inventory exceeds or would be made to exceed 60 days' requirements. The inventory limit on all other forms of molybdenum is 45 days' needs. The inventory provision includes imported as well as domestic molybdenum, except when it has been imported for resale. Molybdenum which has been subjected to minor processing and has not been actually incorporated into any product is to be included in computing inventory.

The amendment also requires the use of substitutes for molybdenum wherever possible.

Farm Equipment Makers May Extend DO's Under New NPA Order

Washington — Farm equipment manufacturers have been authorized under M-55 to apply DO ratings, on their own certification, to obtain materials for June production. Suppliers of materials and components are likewise authorized to extend the ratings.

More than 100 types of equip-

CONTROLS DIGEST

Continued

ment under a score of general categories—such as planting, harvesting, spraying, and irrigating machinery as well as plows and tractors—are included in Schedule 1.

Two major limitations are applicable to use of the ratings. They may not be used to build inventories beyond a practicable working level nor may such orders exceed average levels of first half 1950.

Tin Inventory Delays Are Cut

Washington—National Production Authority has revised M-8 in order to cut delay for suppliers of tin and tin products in replenishing inventories. They may estimate amounts needed to acquire "normal resale" inventory instead of waiting until actual certifications (for permitted uses) are received.

Scrap dealers and smelters are exempted by the amendment from end-use certification in the case of low-grade scrap containing not more than 6 pct tin by weight. Manufacturers who buy tin scrap, however, must still certify their orders.

Nickel Allocation Coming?

Washington — Despite tighter restrictions under latest amendment of M-14, strict allocation of nickel supplies is a definite possibility before the end of the second quarter.

Under the amendment, effective Apr. 15, use of nickel is prohibited for manufacture of additional items. Consumption of primary nickel is continued at 65 pct of base period use.

Thumbs Down on Conveyor Bill

Cleveland—The belt conveyor bill, authorizing construction of the highly controversial but privately financed rubber railroad running from Lake Erie to the Ohio River, died a sudden and surprising death as the rules committee of the 99th Ohio General

Assembly voted to postpone consideration indefinitely.

The rules committee's action was surprising in view of the fact that the Senate judiciary committee had decided to let the entire membership decide the fate of the conveyor belt.

No explanation was given for the action of the seven-member rules committee, one member of which was quoted as saying that "it would take a minor miracle to get the bill reported out." Another said that "only mighty pressure could dislodge the committee from its present sentiments."

GSA Seeks to Reactivate Erie Aluminum Forging Plant

Washington—General Services Administration began negotiations this week with several firms to put the government's aluminum forgings plant at Erie back into production. This is the last inactive aluminum forging facility in the reserve.

More than a dozen firms have been interested in the plant. A GSA official said that all had been asked to submit proposals by the first of this week.

Prospective lessees need not have defense orders to lease the plant. But they must have technical and financial qualifications to produce items which the Munitions Board wants.

The plant's wartime rated capacity was 15,000,000 lb of forgings and was operated by Aluminum Forgings, Inc.

Sharon Tube Pipe Mill

Sharon, Pa.—Sharon Tube Co.'s $2.3 million continuous butt-weld pipe mill, expected to be in operation early next year, will operate at speeds up to 750 fpm. Size range will be ⅛-in. to 3-in.

Aetna-Standard Engineering Co., Youngstown, was awarded the contract for the mill and all buildings and facilities, including a pipe galvanizing unit. When the mill is completed, Sharon Tube will abandon its present plant. A certificate of necessity has been granted.

Mystic Cuts Pig Iron Price When Foreign Ore Deliveries Fail

Price of malleable, No. 2 foundry down $1.50 . . . Will go up Aug. 1st

Boston—Customers of Mystic Iron Works, with plants at Everett, Mass., were pleasantly surprised this week by a $1.50 drop in the price of No. 2 foundry and malleable pig iron.

Failure to receive some foreign ore as scheduled forced Mystic to cut monthly production, substantially increase the foundry grades of iron, and to almost completely exhaust its inventory of ore on hand. Because Mystic used its inventory of lowered-priced ore, it is able to lower second quarter prices.

Second Quarter Drop

Mystic, New England's largest producer of pig iron, dropped its price for second quarter delivery of pig iron from $53.25 to $51.75 for No 2 foundry, and from $53.75 to $52.25 for malleable.

Failure of foreign producers of iron ore to deliver as per contract is given as a reason for the price cut.

Mystic expected to get 80,000 tons of foreign ore—all scheduled for loading prior to Jan. 1, 1951. As of Mar. 1, the company had received one cargo of approximately 3000 tons.

The company, in computing first quarter prices, had averaged the cost of the higher-priced foreign ore with its inventory of lower-priced domestic ores.

The company does not expect the lower price to prevail beyond June and has advised its customers to "anticipate a substantial increase in our base price for the third quarter."

Coke Oven Battery for Crucible

Pittsburgh—Koppers Co., Inc., will design and build a new battery of 29 coke ovens at the Midland, Pa., plant of Crucible Steel Co., which now operates four batteries of 184 ovens. The new units will increase coal carbonizing capacity by 490 tons per day.

Big Stocks, Lower Demand Trouble Consumer Durables Field

Chicago — Although still producing at a high rate because of impending materials shortages and restrictions, the consumer durable goods industry is faced with the problem of swelling inventories, reported James J. Nance, president of Hotpoint, Inc. (THE IRON AGE, Mar. 29, 1951, p. 110.)

Effective demand for home appliances, such as refrigerators and washing machines, is being levelled off by a less tense international situation, higher taxes, credit controls and rising prices. Retailers throughout the country have ample stocks of these consumer durables at the present time and the buying public is not rushing into the market out of fear of future shortages.

It is entirely possible that production of home appliances may drop in the next few months, not so much as the result of materials restrictions but because of slackening demand.

Machine Tool "Idea Exchange"

Cleveland—An "Idea Exchange" bulletin in which machine tool advertising men can discuss matters of common interest will be issued quarterly by the Advertising Committee of the National Machine Tool Builders' Assn. J. E. Craig, advertising manager of Warner & Swasey, this city, is editor. With the debut issue already in print, the bulletin will continue to function as a clearing house for ideas and news of various practices and campaigns in the field.

Lewisburg Coal Mine to Close

Birmingham — Because of an "overabundance of coal," Sloss-Sheffield Steel & Iron Co. will shut down its Lewisburg mine in April and May. Operations in its other three mines will not be influenced. Whether or not the Lewisburg mine will reopen at all has not yet been decided.

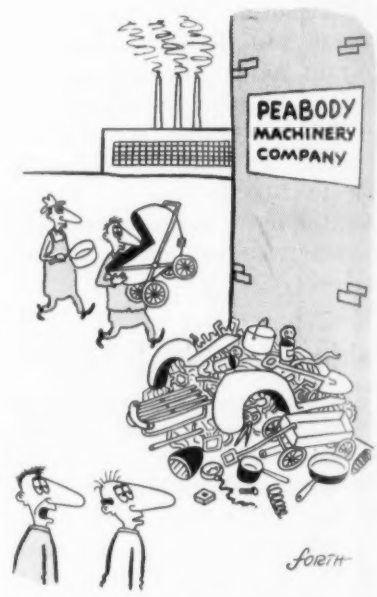
Industrial Building Costs Rise

Cleveland — A 3-point rise in industrial building costs during the first quarter of 1951 to 182 on the Austin Co.'s quarterly index reflects the limited effectiveness of wage and price stabilization efforts, said George A. Bryant, Austin president. Effect of controls on final costs is limited by other factors entering into the expense of completing any project.

Mr. Bryant also reported serious material and equipment shortages which restrict high efficiency and boost costs. Shortage relief from the ban on non-essential construction probably will not be felt for several months and excess stockpiling may aggravate the scarcity in certain materials, he said.

Aluminum Seal Wants Contracts

Richmond, Ind.—Having recently opened a defense production division to design and produce metal ammunition components, Aluminum Seal Co., Inc., is seeking government contracts and subcontracts for defense. The firm, a subsidiary of Aluminum Co. of America, is offering a booklet on facilities here.



"Steel is getting harder and harder to obtain!"

New Sheet Galvanizing Line

Pittsburgh—Wheeling Steel Corp. is contemplating installation of a $2 million continuous sheet galvanizing line, on the basis of pilot plant tests held in the last several months. Other improvements planned include rebuilding and modernizing of Bessemer facilities that will increase capacity by 150,000 tons per year, cost $7 million; modernization of the cold strip mill, cost $8.2 million; and construction of a coal washing plant, cost $6.5 million. The company recently completed a $40 million modernization and improvement program.

NPA Tool Steel Study Ready

Washington—Methods by which molybdenum use in tool steels can be cut from 15 to 20 pct will be recommended by NPA's Industry Advisory Committee in a special study of tool steels. The report will also recommend toolmakers use, where possible, tool steels with a lower percentage of tungsten.

NPA has briefed the committee on proposed use of melt sheets to be used by industry, starting June, for reporting mill production and shipment schedules.

Koppers to Expand Texas Div.

Pittsburgh — A multi-million dollar program of expansion of its Chemical Div., including construction of a new plant near Port Arthur, Texas, and additions to facilities at Kobuta, Pa., has been announced by the Koppers Co.

The new Texas plant will occupy part of a 1000-acre plot west of Port Arthur. The program will enable the Chemical Div. to substantially increase production of styrene monomer and polystyrene.

GM Cuts Weight of Transformers

Schenectady—Weight cuts up to 30 pct on 3-phase transformers have been achieved with Spirakore construction, which uses cold-rolled, oriented-grain steel, reports General Electric's Transformer and Allied Product Div.

STEEL CONSTRUCTION NEWS

Fabricated steel awards this week included the following:

1600 Tons, Coatesville, Pa., centralized maintenance building for Lukens Steel Co., to Bethlehem Steel Co., Bethlehem.

1400 Tons, Philadelphia, Building No. 10 for the Philco Corp., to Bethlehem Steel Co., Bethlehem.

12,000 Tons, Daingerfield, Texas, Lone Star Steel expansion, to American Bridge Co.

1100 Tons, Warren, O., plant building for General Refractories Corp., to American Bridge Co., Pittsburgh.

7000 Tons, Chicago, Freyn Engineering Co. for Republic Steel Corp. Improvements in Cleveland to American Bridge Co.

3000 Tons, Chicago, U. S. Corps of Engineers, Bailey Bridge Components to American Bridge Co.

1000 Tons, Gary, Ind., Taylor Forge Plant to American Bridge Co.

900 Tons, Evanston, Ill., Northwestern Univ. drill hall to American Bridge Co.

650 Tons, Plymouth Meeting, Pa., addition to plant of E. J. Lavino & Co., to Belmont Iron Works.

400 Tons, Ocean County, N. J., highway bridge, New Jersey State Highway Dept., to Bethlehem Steel Co., Bethlehem.

170 Tons, Forest, Ohio, Pennsylvania Rail Road bridge 231.28, to Fort Pitt Bridge Works.

Fabricated steel inquiries this week included the following:

623 Tons Indiana and Westmoreland Counties, Pa., construction of reinforced concrete highway and two continuous concrete Deck plate girder bridges. Secretary of Highways, Harrisburg, Pa. Bids due April 20.

600 Tons, Westmoreland and Indiana Counties, Pa., two viaducts for Pennsylvania State Dept. of Highways. Bids due Apr. 20.

350 Tons, Wilmington, Del., elementary school building. Bids due Apr. 16.

333 Tons, Lehigh County, Pa., construction of divided highway, a plate girder bridge and an I-beam bridge. Secretary of Highways, Harrisburg, Pa. Bids due April 20.

330 Tons, Lehigh County, Pa., highway bridge for Pennsylvania State Dept. of highways.

Reinforcing bar inquiries this week included the following:

185 Tons, Indiana and Westmoreland Counties, Pa., construction of reinforced concrete highway and two continuous concrete Deck plate girder bridges. Secretary of Highways, Harrisburg, Pa. Bids due April 20.

133 Tons Lehigh County, Pa., construction of divided highway, a plate girder bridge and an I-beam bridge. Secretary of Highways, Harrisburg, Pa. Bids due April 20.

publications

Continued from Page 1

of loading; and an automatic illuminated load range indicat Also shown is the new Olsen el tronic recorder. *Tinius Olsen Te ing Machine Co.*

For free copy insert No. 8 on postcard, p.

Fork Truck

The 6000-lb capacity Baker ty FT-60 fork truck is the subject a new 8-p. bulletin listing u benefits and detailing comple specifications. Dimensional dra ings show the maneuverability the truck, and photos show t unit working in 8 different indu tries and 16 different applicatio Also described are 14 of the ma special attachments available f increasing the scope and utility fork trucks. *Baker Industrial Tru Div., Baker-Raulang Co.*

For free copy insert No. 9 on postcard, p.

Pipe Line Filters

With emphasis on the Stayn double-action principle, a new 8- bulletin describes and gives appl cations and specifications for T pipe line filters, including pressu and vacuum types, for air and oth gases. Installation views are show of the new series 600 filters, bui for air pressures up to 6000 p Also shown are vacuum and absor tion types, and special models f the removal of carbon black a aluminum oxide. *Dollinger Cor*

For free copy insert No. 10 on postcard, p.

Cylindrical Grinders

A new 16-p. catalog describin Landis No. 2 Race-A-Way oscillat ing cylindrical grinders includes l pictures showing the machine a various operations which it can per form. This machine is primaril intended for the precision grindin of ball bearing races, but has bee used on other precision operation of a similar nature. *Landis To Co.*

For free copy insert No. 11 on postcard, p.

Pump Bulletin

Peerless Fluidyne pumps of th horizontal, end-section centrifuga type, which have a capacity rang of from 10 to 5500 gpm, are covere

publications

Continued

in a new 24-p. bulletin. Two types of pumps are shown. One is a close-coupled electric motor driven pump, and the other is a bracket-mounted pump for driving through a flexible coupling, V-belt, or flat belt pulley. Ease of maintenance and accessibility are stressed, along with flexibility of installation. *Peerless Pump Div., Food Machinery Corp.*

For free copy insert No. 12 on postcard, p. 3.

Mounting Grinding Wheels

A new 12-p. booklet entitled "Mounting Technique for Wheel Sleeves on Cylindrical Grinding Machines" discusses the proper mounting technique for grinding wheels on sleeve type mounts; it contains recommendations covering the amount of torque or "wrench pull" to use when mounting grinding wheels on several makes of cylindrical grinding machines. The recommendations are based on results of recent experimental field tests. *Grinding Wheel Institute.*

For free copy insert No. 13 on postcard, p. 3.

Viscosity Measurement

A new 12-p. catalog describes instruments that provide an instantaneous method for determining viscosity values for industrial processes. Featured is a new development in this field, the Auto-Sampling Viscorator instrument, which has a constant differential pressure regulator as an integral part of its design, providing a constant meter sample flow rate (regardless of line fluctuations) in a simple self-contained unit. *Fischer & Porter Co.*

For free copy insert No. 14 on postcard, p. 3.

Industrial Lighting

"Planned Lighting for Industry" is a comprehensive 47-p. bulletin that meets the needs of an industry gearing for defense production. It outlines the benefits of good industrial lighting, then describes how to engineer lighting to various industrial tasks, discussing six principal lighting systems, and the use of specific techniques for special needs. The booklet treats of

"balance, 99.99+% zinc"*

DESIGNATION & COMPOSITION OF ZINC DIE CASTING ALLOYS:

	REFERENCE DESIGNATION	ALLOY 2	ALLOY 3	ALLOY 5
	NOMINAL COMPOSITION	Copper 2.5-3.5% Alum. 3.5-4.5% Mag. .02-.10%	Alum. 3.5-4.3% Mag. .03-.08%	Copper .75-1.25% Alum. 3.5-4.3% Mag. .03-.08%
ASTM	*American Soc. for Testing Materials*	*B86—XXI*	*B86—XXIII*	*B86—XXV*
SAE	*Society of Automotive Engineers*	*921*	*903*	*925*
NAVY	*U.S. Navy*		*46Z2b—Class A*	*46Z2b&c—Class B*
ARMY	*U.S. Army*		*57-93-2A Alloy A*	*57-93-2A Alloy B*
FED	*Federal Specifications*		*QQZ—363A*	*QQZ—363B*

The phenomenal growth of the die casting industry—the second largest consumer of zinc today—was chiefly provided by the development of "four-nines" metal—which is standard for all zinc alloy die castings.

Prior to 1928, the year Bunker Hill pioneered the production of "four-nines" metal, zinc die castings based on lower grade metal were restricted in their applications due to limitations in physical properties. But as soon as industry was enabled to write "balance 99.99+% zinc" into their specifications, the quality and stability required in die castings were available and the use of zinc alloy castings increased enormously. Die Casting—the shortest distance between raw material and finished product—proved the answer to industry's need for accurate, high-speed and low-cost production of the most complex parts, in a single operation, just as zinc has proved itself as the ideal base metal for die castings. Currently over 70% of all die castings by weight are made of zinc.

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SALES OFFICE FOR PACIFIC COAST NORTHWEST LEAD COMPANY SEATTLE, WASHINGTON

publications

Continued

the types of light sources and luminaires available, and covers the relationships of brightness and color conditioning. *Lamp Dept., General Electric Co.*

For free copy insert No. 15 on postcard, p. 35.

Cement on Steel Gridwork

An illustrated data sheet shows the step-by-step procedure for applying corrosion-resistant cement over steel gridwork. Cement on steel grating linings offers high resistance to erosion, and successful installations have been made in refineries for lining points of attack in fluid catalytic cracking equipment in the feed and return lines, fittings, valves and cyclone equipment. *Pennsylvania Salt Mfg. Co.*

For free copy insert No. 16 on postcard, p. 35.

Metal Cleaning

Oakite CrysCoat is described in a new folder telling how this product (1) simultaneously cleans and conditions metal surfaces for painting, (2) improves adhesion of paint to metal, (3) prevents corrosion before metal is painted, and (4) localizes corrosion under paint if finish is scratched or damaged. Other advantages are detailed, demonstrating the substantial cost savings that are possible. *Oakite Products, Inc.*

For free copy insert No. 17 on postcard, p. 35.

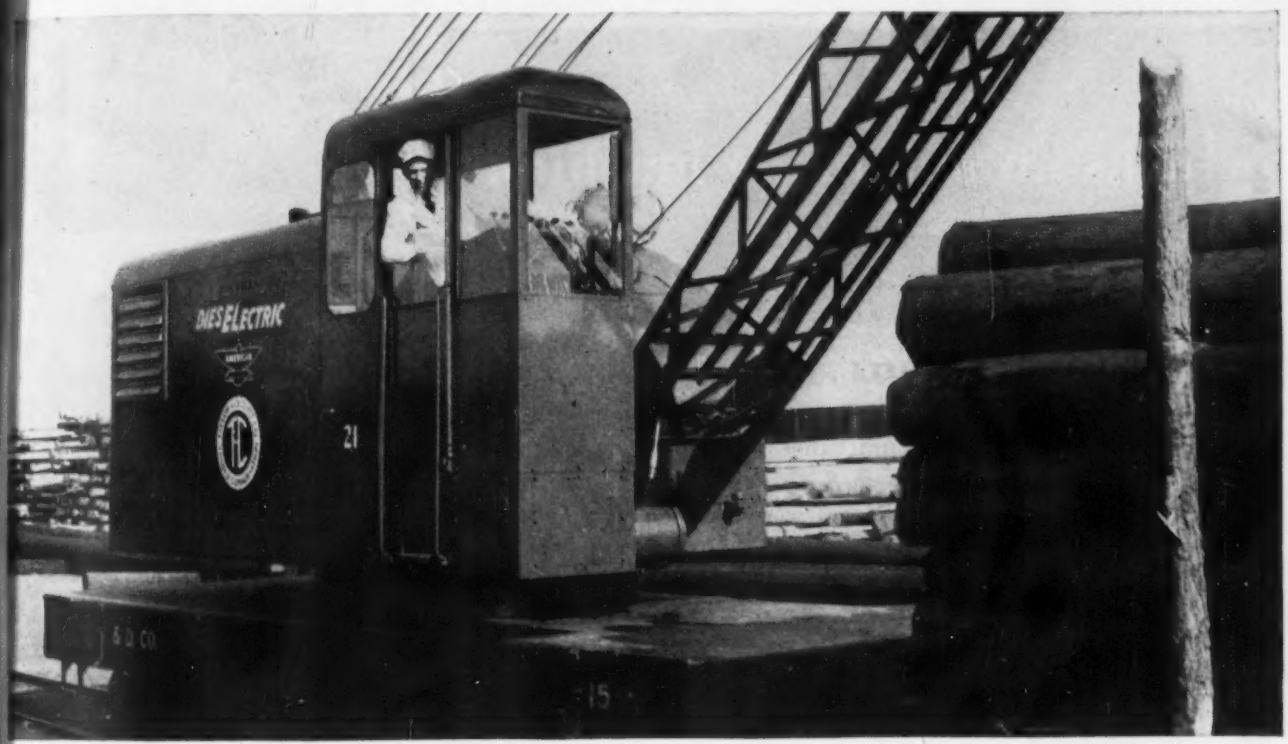
Marking Devices

A "job-indexed" catalog of marking devices, designed to simplify selection of such devices, illustrates all standard holders for doing each particular class of work manually or on machines alongside of each other so that it becomes a simple matter to select the holder best suited to any given application. Standard holders for other applications, typical custom markers, automatic roll markers for use on screw machines, embossing dies, logotypes, roll dies and other devices are similarly grouped. *New Method Steel Stamps, Inc.*

For free copy insert No. 18 on postcard, p. 35.

Resume Your Reading on Page 35

And now-eight!



TAYLOR-COLQUITT, at Spartanburg, So. Carolina, really knows costs in the pole and tie business. So when they bought their first American DiesELectric locomotive cranes, they watched expenses with an eagle eye.

Today, Taylor-Colquitt is operating their *eighth* 25-ton American DiesELectric. The two big reasons for these re-orders are: *more work done, less money spent.* To them, experience has proved that DiesELectric design (diesel power to the deck; electric power to the trucks) means not only more tonnage per day but a wonderful reduction of "down" time and repair expense.

To find out how American DiesELectric design has eliminated tons of wearing parts . . . how these cranes pay for themselves in five years . . . mail the coupon below.

Whether you handle wood or metal . . . look for BIG SAVINGS with the American DiesELectric!

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Capacity _____ tons ☐ Diesel ☐ DiesELectric

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Company _____

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production ideas

Continued from Page

with fragile and extremely sm pivots, for components made hard material or with special to shapes. The first cutter is f roughing, the second for finishi the teeth. Work is held to tol ances of ±0.00005 in. dependi

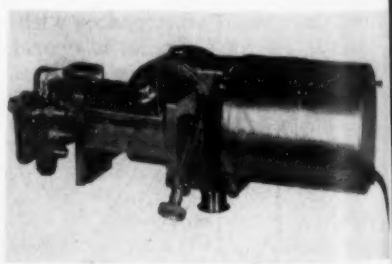
upon the material and the require ments of the job. Maximum Modul in steel is 0.30, in brass 0.50, an maximum tooth length is 0.5 in The machine generates gears an pinions of 6 to 60 straight teeth in one cut. One operator can handle several of the machines when using automatic feed. All functions are automatic. *Carl Hirschmann Co.*

For more data insert No. 36 on postcard, p. 3

Metal Spraying Gun

Adds metal to metal by wire stock atomization at 6300°F.

Designed for coating, shafts, rolls, or machine element parts from a lathe mounting, a new metal

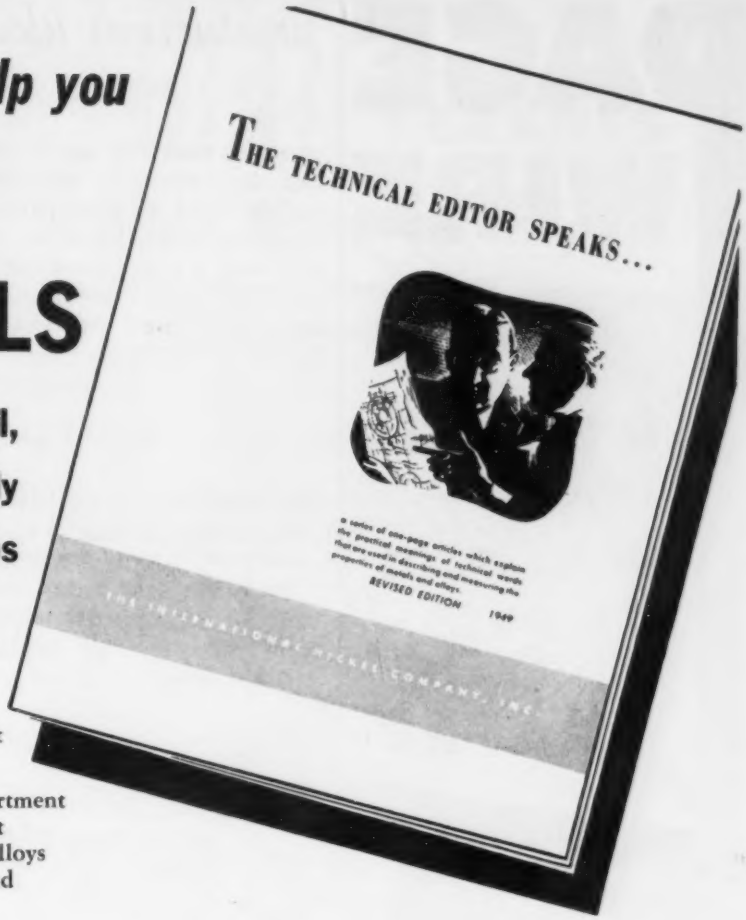


spraying gun, called the Mogulectric, has an increased spraying speed. It can also be used for spraying tanks and structural members. It adds metal to metal with a perfect bond, it is claimed. In addition to rebuilding worn parts, it is said to be excellent for spraying

This free booklet will help you

GET MORE OUT OF METALS

...and also understand why Monel, Nickel and Inconel are critically needed for the "really tough" jobs



Here's a booklet that's a "must" for anyone who chooses or uses metals.

And, with metals being diverted to defense, it's a *timely* booklet that can help you make the best use of the metals you're getting.

Written by the Development and Research Department of The International Nickel Company, this booklet explains the mechanical properties of metals and alloys so that the reader is able to understand, compare and judge their values for practical applications.

It explains in one-page treatments many of the technical terms and testing procedures needed for a working knowledge of metal behavior.

Also included are many tables of data for comparing the suitability of Inco Nickel Alloys for applications requiring a corrosion-resisting material with high mechanical properties.

Any one who absorbs the information in this booklet will be equipped to do a better job of metal selection. If you're an established engineer, send for this booklet and consider it a quickie refresher course. If you're a newcomer to metals, use this booklet as the shortest cut to acquiring a practical knowledge of metals.

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INCONEL® • INCONEL "X"®

36 PAGES OF INFORMATION ABOUT METALS

Tensile Properties
Yield Strength, Proportional Limit, Proof Stress, Rigidity, Modulus of Elasticity, Ductility.

Torsional Properties
Twist Resistance.

Hardness
Brinell, Rockwell and Vickers Tests. The Scleroscope.

Toughness
Impact Strength, Izod and Charpy Tests. Tension and Torsion Impact.

Shear Strength

High Temperature Properties

Thermal Expansion

Low Temperature Properties

Fatigue
Effect of Keyways on fatigue of shafting.

Corrosion
Concentration-Cell, Galvanic.

Cavitation-Erosion

Physical Constants and Mechanical Properties of Important Metals

Conversion Tables
Measurements.

Definition and Glossary of Terms

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I.A. 5-5-51

production ideas

Continued

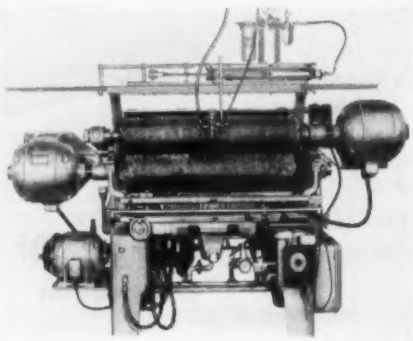
corrosion-resistant metal coatings and for reclaiming mis-machined castings and machine parts. The Mogulectric weighs 20 lb, is powered with a 1/20 hp constant speed induction motor, assuring a uniform wire speed that can be adjusted to the type of metal being sprayed. *Metallizing Co. of America.*

For more data insert No. 37 on postcard, p. 35.

Surface Finishing Machine

Finishes both surfaces of flat or contoured items to any degree.

Providing automatic float of buffs at any predetermined uniform pressure, both surfaces of flat or contoured items may be



finished to any degree from flash removal to mirror finish with Model 202 surface finishing machine. It is equipped with two spindles to accommodate rolls 40 in. wide and up to 9 in. diam. The automatic hydraulic *in* and *out* stroke is adjustable from ⅜ to 24 in. A bar mounted across the front serves to open instantly the rolls and arrest all actuation for loading or as an emergency measure. Choice of horsepower, variable speed controls, and automatic cycling devices are optional features. *Clair Mfg. Co., Inc.*

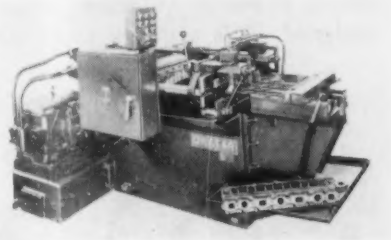
For more data insert No. 38 on postcard, p. 35.

Broaching Machine

Broaches 12 valve guide bushings in a truck engine head simultaneously.

Twelve valve guide bushings, previously pressed into a six cylinder truck engine head simultaneously on an Oilgear 25-ton two-column vertical pushemall press, are broached simultaneously on a

special 16-ton horizontal broaching machine. Salient features of the broaching machine are a selector switch for semi-cycle or manual control, fully interlocked cycle to protect tools and work, variable



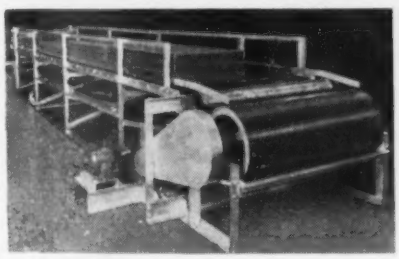
broaching and return speed and hydraulic clamping and group handling of tools. Approximately 0.010 in. stock is removed. Stroke is adjustable from 6 to 12 in. Broaching speed is 30 fpm, return speed, 25 fpm. *Oilgear Co.*

For more data insert No. 39 on postcard, p. 35.

Coating Conveyer

For coating and drying sheet metal.

Metal sheets are pulled by power on a large steel roller. A machine applies the coating at the start of the conveyer. Both sides of the sheet steel are coated simultaneously and as the coated material moves down the conveyer, a series of infra-red lamps dries the coating by the time the metal reaches the end. The entire cycle is automatic. The conveyer framework is structural steel, belted and welded. Dimensions are 20 ft long x 4 ft wide x 3 ft high. This unit can also be adapted to handle flat parts. *Klaas Machine & Mfg. Co.*



For more data insert No. 40 on postcard, p. 35.

Variable Speed Motor

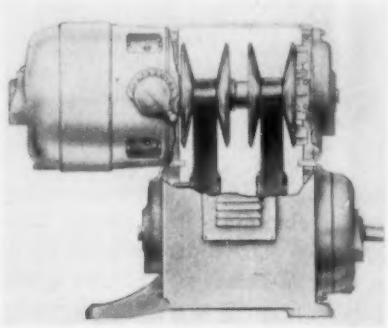
Dual transmission belts distribute the load, offsetting undue strain.

A line of extra heavy duty motors for variable speed with ratings up to 50 hp incorporate dual varibelts to carry the heavy load through the internal speed changing transmis-

production ideas

Continued

sion, thus distributing the load so that no undue strain is imposed. To counterbalance belt load, tension control known as Autotaut has been designed. This principle avoids the



disadvantage of variable center drives or extra flexing of belts over idlers. Use of dual belts does not affect the ease of changing motor speeds that is accomplished by turning a control dial. *U. S. Electrical Motors, Inc.*

For more data insert No. 41 on postcard, p. 35.

Forging Conveyer

Double-bottom trough, steel flights for handling forgings and castings.

Designed for handling all types of forgings and castings, a new conveyer series, Universal 500-F, is built with double-bottom trough and heavy bar flights, thereby

eliminating the belt replacement problem. It is available in four standard lengths, 6, 8, 10 and 12 ft, with relative maximum elevations. Channel width is 15½ in. The steel flights are riveted to open-link steel chain with ultimate tensile strength of 4400 lb per chain. Flights are spaced on 18-in.

centers. The chain has 70 fpm speed and is fully protected with heavy guards extending full length of the conveyer. The motor is mounted on top of channel for protection against the heat of parts being handled. *Industrial Engineering & Mfg. Co.*

For more data insert No. 42 on postcard, p. 35.

Drop Hammer

Piston-lift, gravity drop, for work requiring short snappy strokes.

The ram of the Model C Ceco-Drop is lifted by a piston operating in a cylinder and falls by gravity. The piston rod is held by a special

clamp when not operating. When the operator steps on the treadle, an air valve releases the clamp and the rod rides freely up or down. Guides, cylinder and valves are lubricated automatically by a motor-driven lubricator. The stroke is controlled by quick positioning dogs mounted on a pivoted rocker that is in turn connected to the operating valve. Where it is desired to change from long stroke to short stroke or vice-versa, the Ceco-Drop short stroke control may be attached. The Ceco-Drop has a 20 to 1 anvil. *Chambersburg Engineering Co.*

For more data insert No. 43 on postcard, p. 35.

Flash-Butt Welder

Welds tubular chair rung to tubular legs of metal chairs.

A flash-butt welder welds simultaneously both ends of a tubular chair rung to the tubular legs of metal chairs. The simplicity of the

production ideas

Continued

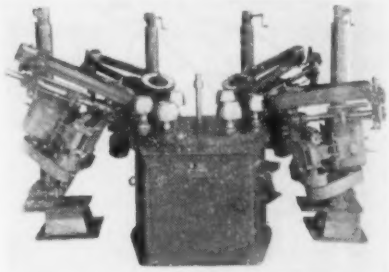
equipment assures that relatively unskilled operators can obtain consistently high quality welds. Two vertical pneumatic clamps hold the rung in the lower dies. Flashing and upsetting are automatically accomplished by an air cylinder actuating gear and rack mechanism inter-connecting the right and left platens. The platen travel during the upset stroke can be adjusted so as to insure strong welds with a smooth surface that does not require grinding or dressing prior to painting. Welding one complete chair takes 10 sec. *Sciaky Bros.*

For more data insert No. 44 on postcard, p. 35.

Polishing-Buffing Machine

Polishing belt arm attachment is adjustable, horizontal to vertical.

The machine shown is a six station indexing rotary with four Acme adjustable floating head buffing lathes equipped with the new polishing belt arm attachment. It is used for polishing automotive grille parts. The machine has one second indexing interval, the same as all Acme indexing rotaries and can be furnished with other fea-



tures such as geared chucks, oscillating arms, automatic locking tail stocks, vacuum chucking, and special fixtures. Stroking spindle arrangement for longer belt life, vertical power traverse, reciprocative actions and air lift can also be provided with these Acme arrangements. *Acme Mfg. Co.*

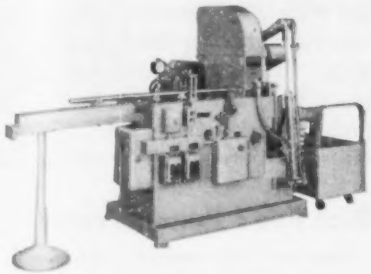
For more data insert No. 45 on postcard, p. 35.

Cutting Machine

Cuts to 2-in. diam solid annealed, unannealed steel; 3½ in. diam tube.

A new fully automatic wet abrasive cutting machine is sequence timed. No adjustment of the time

cycle is required, regardless of the size of stock being cut or the length of the feed up to 12 in. Every operation—stock feed, clamping, wheel



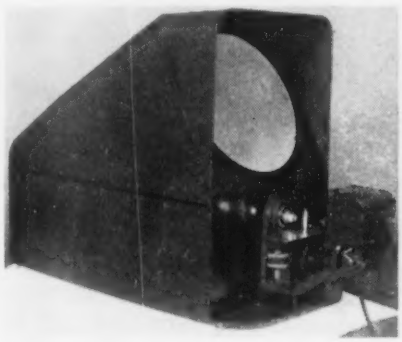
feed, adjustment for wheel wear and ejection of cut pieces—is automatic. *Campbell Machine Div., American Chain & Cable Co., Inc.*

For more data insert No. 46 on postcard, p. 35.

Optical Projector

Simple operation; 14½ in. diam image screen; large working area.

A new production type optical projector is intended for all classes of optical projection work. Its rugged construction makes it suited for optical inspection operations out in the shop next to production ma-



chines, or on the inspection line. It is a full sized machine and may be equipped with various power lens units including 10X, 25X, 50X, 90X or 100X magnification. *Portman Instrument Co.*

For more data insert No. 47 on postcard, p. 35.

Freight Truck

Battery-operated; used in plants for pick-up or delivery.

Called the Load-Mobile, the Marforge truck features three-way operating positions, providing safety, comfort and maneuverability. The operator can sit facing away from the load; face the load, for narrow passages; or stand on the special step for easy access on and off the

production ideas

Continued

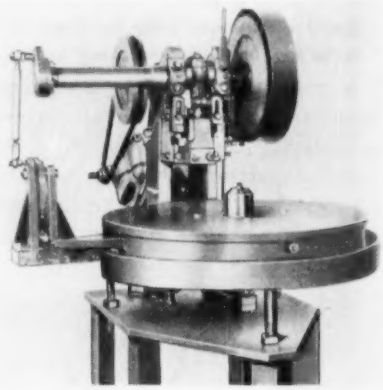
truck. Large capacity cushion rubber wheels with sealed ball-bearings assure minimum drain on the battery. With full load, a 3000-lb truck goes 3 mph and a 5000 lb, 2.5 mph. *Market Forge Co.*

For more data insert No. 48 on postcard, p. 35.

Dial Feed Punch Press

Five-ton back geared O.B.I. punch press with 1 or 2-in. stroke.

The dial feed of this Speedex press is mounted directly on the frame of the press and connected to the crankshaft by an adjustable rod with an eccentric drive. The timing on the index feed is adjustable by rotating the timing cam on the crankshaft of the press. The index feed is positive acting, accurate to 0.0002 in. and has a locking arrangement that locks it in position at each stroke of the press. Presses can be furnished with 12, 15 or 24-in. diam index feeds. *O. F. de Castro & Associates.*



For more data insert No. 49 on postcard, p. 35.

High Temperature Paint

Forms bright finish that is resistant to 1900°F temperatures.

The material is known as Fire-Gard and can be applied to all types of wood or metal surfaces by conventional application methods. Besides being resistant to high temperatures it resists moisture, corrosion, mild acids, mild alkalies, and oxidation or fumes encountered in industrial plants. These paints are available in aluminum and most colors including black and white. *Fire-Gard, Inc.*

For more data insert No. 50 on postcard, p. 35.

Resume Your Reading on Page 39

IRON AGE *markets and prices*

market briefs and bulletins

pig iron price cut—Mystic Iron Works, one of New England's largest producers of pig iron, has announced a cut of $1.50 in the price of No. 2 foundry and malleable iron. Failure of foreign shippers to meet delivery schedules forced Mystic to use its inventory of lower-priced domestic ores. (See p. 128.)

contract awarded—Contract for the new Reynolds Metal Co. $80 million aluminum reduction plant near Corpus Christi, Tex. has been let to Henry C. Beck and Co., of Dallas, and H. R. Henderson Co., of Marshall, Tex. Work is scheduled to start at once and the plant will be in production by Jan. 1, 1952. It will have an annual capacity of 150 million lb of pig aluminum.

corrosion resistant—Cooper Alloy Foundry Co. of Unionville, N. J., has announced a new corrosion resistant cast-steel alloy to be known as V-2-B. The alloy, for which patent applications have been filed, was developed by Norman S. Mott, metallurgist. Small quantities of the metal are available for research use.

expediters—Industrial expediters are back on the job. Few firms call them that, but most companies have assigned at least one of their best men to this type work. It covers a broad range, from interpreting government orders to company executives, to obtaining material, to seeking defense business.

saves tin—U. S. Steel Corp. plans to save enough tin to make 1 million additional tin cans with a new testing method for measuring tinplate. A new machine involving Geiger counters and X-rays is used. The counter measures the reflecton of X-rays from the coated steel sheet. Formerly the thickness of tinplate was measured by scratching.

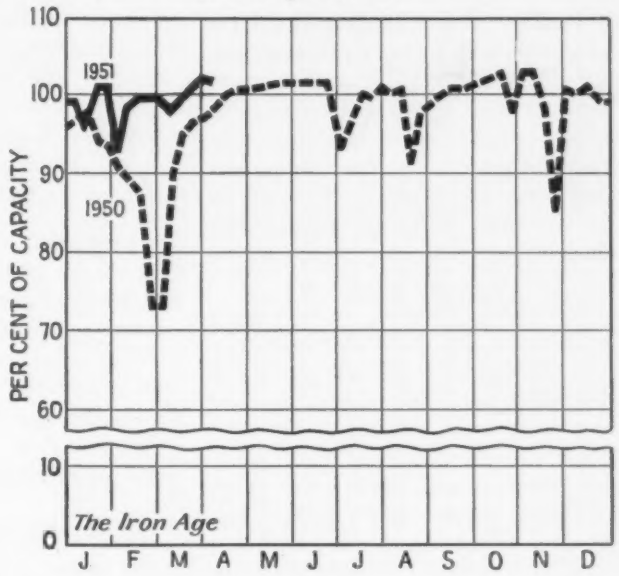
hot strip mill—U. S. Steel Co. has awarded Mesta Machine Co. the contract for an 80-in. continuous hot strip mill at the Fairless Works. Facilities include a vertical edger scale breaking stand, broadside stand, four roughing stands, six finishing stands, a run-out table, and three coilers. Overall length of the mill will be one-third mile.

problem of deflation—Whether or not the government has enough of the necessary data to start a controlled materials plan by July is a matter of speculation in industry. Reports seeping out of Washington tell of fantastic requests for steel, aluminum and copper. Adding all claims is expected to result in an impossibly large figure. Deflating these "minimum" requests is one of the toughest jobs in Washington today.

tires tie up trailers—Inability of manufacturers to obtain large size tires is holding up delivery of truck trailers. One company, victim of non-delivery of tires, was forced to deliver its trailers without tires. Tire manufacturers, who lay the blame on the rubber cut-back, say they may have to lay off workers.

U. K. prices up—The British Ministry of Supply has increased the prices of copper, lead and zinc. Sharpest rise was a 3¢ boost in lead to the equivalent of 20¢ per lb. Zinc was raised 1⅛¢ to 20¢ per lb and copper went up 1¢ to 26¼¢ per lb.

Steel Operations**



District Operating Rates—Per Cent of Capacity**

Week of	Pittsburgh	Chicago	Youngstown	Philadelphia	West	Buffalo	Cleveland	Detroit	Wheeling	South	Ohio River	St. Louis	East	Aggregate
Mar. 25	99.0*	107.5*	96.0*	100.0	106.0	104.0	99.0	104.0*	100.0	102.5	92.0	95.1	105.1	103.0
Apr. 1	98.0	104.0	95.0	100.0	104.0	104.0	97.5	104.0	99.0	102.5	92.5	90.6	90.2	102.5

* Revised.
** Beginning Jan. 1, 1951, operations are based on annual capacity of 104,229,650 net tons.

nonferrous metals

outlook and market activities

NONFERROUS METALS PRICES

	Mar. 28	Mar. 29	Mar. 30	Mar. 31	Apr. 2	Apr. 3
Copper, electro, Conn.	24.50	24.50	24.50	24.50	24.50	24.50
Copper, Lake delivered	24.625	24.625	24.625	24.625	24.625	24.625
Tin, Straits, New York	$1.34	$1.46	$1.505	....	$1.505	$1.505
Zinc, East St. Louis	17.50	17.50	17.50	17.50	17.50	17.50
Lead, St. Louis	16.80	16.80	16.80	16.80	16.80	16.80

Note: Quotations are going prices.

by R.Hatschek

Aluminum Scrap Up — Dealers finally gave way to the terrific pressure of competition for aluminum scrap and raised their buying prices. Pistons and struts are up ½¢ to 13¢ to 13½¢ per lb; 2S clippings, up 1½¢ to 20½¢ to 21¢ per lb; crankcases, old sheet, cast and dural clippings, all up 1¢ to 16½¢ to 17¢ per lb.

Dealers are still awaiting government action on price controls for scrap metals. They are wondering just how long the Economic Stabilization Agency can procrastinate and one was even begining to wonder *if* controls really were in the cards for the metals.

February Output — Aluminum production for February was 62,740 tons, which brings the total for 1951 to 130,694 tons, according to Bureau of Mines reports. There is an apparent drop of a bit more than 5000 tons from January output but, on a daily basis, production was actually slightly higher. An 800,000 ton year is indicated by these figures.

Tin Rides Again—Last Thursday the Reconstruction Finance Corp. raised the selling price of grade A tin 12¢ per lb to $1.46, just about matching the Singapore price. The following day, after the eastern market reacted upward 4½¢ on the news, RFC again raised its price, this time to $1.50½ per lb.

The obvious reason is that RFC wants to meet costs but it has also been speculated that the method of pricing Bolivian tin, according to the market price one month after the sale, had its influence in RFC's action. So, the spiral seems to be on its way again. The United States' abstinence from the eastern market, however, is almost certain to bring down the price of tin sometime in the near future.

Platinum Restricted — Severe shortages of platinum have caused National Production Authority to issue a new order curtailing the metal's use. M-54, effective Mar. 31, prohibits delivery or acceptance for the manufacture of several consumer items, mainly in the jewelry line. Other restrictions are placed on delivery and acceptance for non-prohibited uses and inventories of the metal are limited to either a practical working minimum or 60 days, whichever is less.

MONTHLY AVERAGE PRICES

The average prices of the major non-ferrous metals in March based on quotations appearing in THE IRON AGE, were as follows:

	Cents Per Pound
Electrolytic copper, Conn. Valley	24.50
Lake copper, delivered	25.625
Straits tin, New York	$1.4546
Zinc, East St. Louis	17.50
Zinc, New York	18.22
Lead, St. Louis	16.80
Lead, New York	17.00

Zinc Freight Up—At noon yesterday, the 4 pct freight increase on zinc went into effect. This boost brings Prime Western zinc to 18.2519¢, Brass Special to 18.5019¢, and Intermediate to 18.7519¢ per lb delivered at New York. At press time, it was believed that the extra cost on High Grade and Special High Grade would be absorbed by producers.

The prices shown in this issue of THE IRON AGE are those of Tuesday and, for that reason, do not reflect the increases.

Lead Cut Arrives—NPA this week issued an order cutting back on the use of lead in civilian products to 100 pct of the first half of 1950. Actually, this is a rather severe cut, for civilian consumption during that period was at a monthly rate of 82,700 tons while for the second half of the year civilian use rose to a rate of 119,800 tons monthly.

The cutback is about 37,100 tons per month or some 31 pct. A 20 pct reservation for DO orders was included.

MILL PRODUCTS

(Cents per lb, unless otherwise noted)

Aluminum

(Base 30,000 lb, f.o.b. ship. pt. frt. allowed)

Flat Sheet: 0.188 in., 2S, 3S, 30.1¢; 4S, 61S-O, 32¢; 52S, 34.1¢; 24S-O, 24S-OAL, 32.9¢; 75S-O, 75S-OAL, 39.9¢; 0.081 in., 2S, 3S, 31.2¢; 4S, 61S-O, 33.5¢; 52S, 35.6¢; 24S-O, 24S-OAL, 34.1¢; 75S-O, 75S-OAL, 41.8¢; 0.032 in., 2S, 3S, 32.9¢; 4S, 61S-O, 37.1¢; 52S, 39.8¢; 24S-O, 24S-OAL, 41.7¢; 75S-O, 75S-OAL, 52.2¢.

Plate: ¼ in. and heavier: 2S, 3S-F, 28.3¢; 4S-F, 30.2¢; 52S-F, 31.8¢; 61S-O, 30.8¢; 24S-O, 24S-OAL, 32.4¢; 75S-O, 75S-OAL, 38.8¢.

Extruded Solid Shapes: Shape factors 1 to 5, 36.2¢ to 74.5¢; 12 to 14, 36.9¢ to 89¢; 24 to 26, 39.6¢ to $1.16; 36 to 38, 47.2¢ to $1.70.

Rod, Rolled: 1.5 to 4.5 in., 2S-F, 3S-F, 37.5¢ to 33.5¢; cold-finished, 0.375 to 3 in., 2S-F, 3S-F, 40.5¢ to 35¢.

Screw Machine Stock: Rounds, 11S-T3, ⅛ to 11/32 in., 53.5¢ to 42¢; ⅜ to 1½ in., 41.5¢ to 39¢; 1 9/16 to 3 in., 38.5¢ to 36¢; 17S-T4 lower by 1.5¢ per lb. Base 5000 lb.

Drawn Wire: Coiled, 0.051 to 0.374 in., 2S, 39.5¢ to 29¢; 52S, 48¢ to 35¢; 56S, 51¢ to 42¢; 17S-T4, 54¢ to 37.5¢; 61S-T4, 48.5¢ to 37¢; 75S-T6, 84¢ to 67.5¢.

Extruded Tubing, Rounds: 63-S-T5, OD in in.: 1¼ to 2, 37¢ to 54¢; 2 to 4, 33.5¢ to 45.5¢; 4 to 6, 34¢ to 41.5¢; 6 to 9, 34.5¢ to 43.5¢.

Roofing Sheet, Flat: 0.019 in. x 28 in. per sheet, 72 in., $1.142; 96 in., $1.522; 120 in., $1.902; 144 in., $2.284. Gage 0.024 in. x 28 in., 72 in., $1.379; 96 in., $1.839; 120 in., $2.299; 144 in., $2.759. Coiled Sheet: 0.019 in. x 28 in., 28.2¢ per lb.; 0.024 in. x 28 in., 26.9¢ per lb.

Magnesium

(F.o.b. mill, freight allowed)

Sheet and Plate: FS1-O, ¼ in. 63¢; 3/16 in. 65¢; ⅛ in. 67¢; B & S Gage 10, 68¢; 12, 72¢; 14, 78¢; 16, 85¢; 18, 93¢; 20, $1.05; 22, $1.27; 24, $1.67. Specification grade higher. Base: 30,000 lb.

Extruded Round Rod: M, diam in., ¼ to 0.311 in., 74¢; ½ to ¾ in., 57.5¢; 1¼ to 1.749 in., 53¢; 2½ to 5 in., 48.5¢. Other alloys higher. Base: Up to ¾ in. diam, 10,000 lb; ¾ to 2 in., 20,000 lb; 2 in. and larger, 30,000 lb.

Extruded Solid Shapes, Rectangles: M. In weight per ft, for perimeters less than size indicated. 0.10 to 0.11 lb, 3.5 in., 62.3¢; 0.22 to 0.25 lb, 5.9 in., 59.3¢; 0.50 to 0.59 lb, 8.6 in., 56.7¢; 1.8 to 2.59 lb, 19.5 in., 53.8¢; 4 to 6 lb, 28 in., 49¢. Other alloys higher. Base, in weight per ft of shape: Up to ½ lb, 10,000 lb; ½ to 1.80 lb, 20,000 lb; 1.80 lb and heavier, 30,000 lb.

Extruded Round Tubing: M, wall thickness, outside diam, in., 0.049 to 0.057, ¼ in. to 5/16, $1.40; 5/16 to ¾, $1.26; ½ to ⅝, 93¢; 1 to 2 in., 76¢; 0.165 to 0.219, ⅝ to ¾, 61¢; 1 to 2 in., 57¢; 3 to 4 in., 56¢. Other alloys higher. Base, OD in in.; Up to 1¼ in., 10,000 lb; 1¼ in. to 3 in., 20,000 lb; 3 in. and larger, 30,000 lb.

Titanium

(10,000 lb base, f.o.b. mill)

Commercially pure and alloy grades: Sheet and strip, HR or CR, $15; Plate, HR, $12; Wire, rolled and/or drawn, $10; Bar, HR or forged, $6; Forgings, $6.

Nickel and Monel

(Base prices, f.o.b. mill)

	"A" Nickel	Monel
Sheets, cold-rolled	71½	57
Strip, cold-rolled	77½	60
Rods and bars	67½	55
Angles, hot-rolled	67½	55
Plates	69½	56
Seamless tubes	100½	90
Shot and blocks	....	50

Copper, Brass, Bronze

(Freight prepaid on 200 lb includes duty)

	Sheet	Rods	Extruded Shapes
Copper	41.03	....	40.63
Copper, h-r	....	36.88	....
Copper, drawn	....	38.18	....
Low brass	39.15	38.84	....
Yellow brass	38.28	37.97	....
Red brass	40.14	39.83	....
Naval brass	43.08	38.61	38.07
Leaded brass	....	32.63	36.70
Com'l bronze	41.13	40.82	....
Mang. bronze	45.96	40.65	41.41
Phos. bronze	60.20	60.45	....
Muntz metal	40.43	36.74	37.99
Ni silver, 10 pct	49.27	51.49	....
Arch. bronze	....	....	35.11

PRIMARY METALS

(Cents per lb, unless otherwise noted)

Aluminum ingot, 99+%, 10,000 lb, freight allowed	19.00
Aluminum pig	18.00
Antimony, American, Laredo, Tex.	42.00
Beryllium copper, 3.75-4.25% Be	$1.56
Beryllium aluminum 5% Be, Dollars per lb contained Be	$69.00
Bismuth, ton lots	$2.25
Cadmium, del'd	$2.55
Cobalt, 97-99% (per lb)	$2.10 to $2.17
Copper, electro, Conn. Valley	24.50
Copper, Lake, delivered	24.625
Gold, U. S. Treas., dollars per oz.	$35.00
Indium, 99.8%, dollars per troy oz.	$2.25
Iridium, dollars per troy oz.	$200
Lead, St. Louis	16.80
Lead, New York	17.00
Magnesium, 99.8+%, f.o.b. Freeport, Tex., 10,000 lb	24.50
Magnesium, sticks, 100 to 500 lb	42.00 to 44.00
Mercury, dollars per 76-lb flask, f.o.b. New York	$216-$220
Nickel, electro, f.o.b. New York	53.55
Nickel oxide sinter, f.o.b. Copper Cliff, Ont., contained nickel	46.75
Palladium, dollars per troy oz.	$24.00
Platinum, dollars per troy oz.	$90 to $93
Silver, New York, cents per oz.	90.16
Tin, New York	$1.505
Titanium, sponge	$5.00
Zinc, East St. Louis	17.50
Zinc, New York	18.22
Zirconium copper, 50 pct	$6.20

REMELTED METALS

Brass Ingot

(Cents per lb delivered, carloads)

85-5-5-5 ingot	
No. 115	29.00
No. 120	28.50
No. 123	28.00
80-10-10 ingot	
No. 305	35.00
No. 315	32.00
88-10-2 ingot	
No. 210	47.50
No. 215	44.50
No. 245	37.00
Yellow ingot	
No. 405	25.50
Manganese bronze	
No. 421	32.75

Aluminum Ingot

(Cents per lb, 30,000 lb lots)

95-5 aluminum-silicon alloys	
0.30 copper, max.	34.50-36.25
0.60 copper, max.	34.25-36.00
Piston alloys (No. 122 type)	31.00-32.50
No. 12 alum. (No. 2 grade)	30.25-31.25
108 alloy	31.50-32.00
195 alloy	32.50-33.00
13 alloy	34.50-36.00
ASX-679	31.50-33.25

Steel deoxidizing aluminum, notch-bar granulated or shot

Grade 1—95.97½%	32.50-33.50
Grade 2—92-95%	31.50-32.50
Grade 3—90-92%	30.50-31.50
Grade 4—85-90%	29.50-30.50

ELECTROPLATING SUPPLIES

Anodes

(Cents per lb, freight allowed, 500 lb lots)

Copper	
Cast, oval, 15 in. or longer	39½
Electrodeposited	33⅜
Rolled, oval, straight, delivered	38⅞
Forged ball anodes	43
Brass, 80-20	
Cast, oval, 15 in. or longer	34¾
Zinc, oval	26½
Ball anodes	25½
Nickel 99 pct plus	
Cast	70.50
Rolled, depolarized	71.50
Cadmium	$2.80
Silver 999 fine, rolled, 100 oz lots, per troy oz, f.o.b. Bridgeport, Conn.	79½

Chemicals

(Cents per lb, f.o.b. shipping points)

Copper cyanide, 100 lb drum	52.15
Copper sulfate, 99.5 crystals, bbl.	12.85
Nickel salts, single or double, 4-100 lb bags, frt. allowed	20½
Nickel chloride, 375 lb drum	27½
Silver cyanide, 100 oz lots, per oz	67¼
Sodium cyanide, 96 pct domestic 200 lb drums	19.25
Zinc cyanide, 100 lb drums	45.85

SCRAP METALS

Brass Mill Scrap

(Cents per pound, add ½¢ per lb for shipments of 20,000 to 40,000 lb; add 1¢ for more than 40,000 lb)

	Heavy	Turnings
Copper	23	22¼
Yellow Brass	20½	18¾
Red brass	21½	20¾
Comm. bronze	21¾	21
Mang. bronze	19½	18⅝
Brass rod ends	19⅞	....

Custom Smelters' Scrap

(Cents per pound, carload lots, delivered to refinery)

No. 1 copper wire	21.50
No. 2 copper wire	20.00
Light copper	19.00
Refinery brass	19.50*
Radiators	15.00

*Dry copper content.

Ingot Makers' Scrap

(Cents per pound, carload lots, delivered to producer)

No. 1 copper wire	28.00-29.00
No. 2 copper wire	25.00-26.00
Light copper	23.50-24.50
No. 1 composition	24.50-25.00
No. 1 comp. turnings	24.00-24.50
Rolled brass	19.00
Brass pipe	20.50
Radiators	19.00-19.50
Heavy yellow brass	19.00-19.50
Aluminum	
Mixed old cast	20 —21
Mixed new clips	23 —24
Mixed turnings, dry	20½—21
Pots and Pans	20½—21
Low copper	25

Dealers' Scrap

(Dealers' buying prices, f.o.b. New York in cents per pound)

Copper and Brass

No. 1 heavy copper and wire	25½
No. 2 heavy copper and wire	24
Light copper	22
New type shell cuttings	22
Auto radiators (unsweated)	17 —17½
No. 1 composition	21 —21½
No. 1 composition turnings	20 —20½
Clean red car boxes	18 —18½
Cocks and faucets	18 —18½
Mixed heavy yellow brass	16 —16½
Old rolled brass	18 —18½
Brass pipe	19 —19½
New soft brass clippings	19 —20
Brass rod ends	18 —18½
No. 1 brass rod turnings	17½—18

Aluminum

Alum. pistons and struts	13 —13½
Aluminum crankcases	16½—17
2S aluminum clippings	20½—21
Old sheet and utensils	16½—17
Borings and turnings	12½—13
Misc. cast aluminum	16½—17
Dural clips (24S)	16½—17

Zinc

New Zinc clippings	16 —17
Old Zinc	11 —12
Zinc routings	8½— 9
Old die cast scrap	8 — 8½

Nickel and Monel

Pure nickel clippings	90 —100
Clean nickel turnings	80 —90
Nickel anodes	90 —100
Nickel rod ends	90 —100
New Monel clippings	30 —35
Clean Monel turnings	20 —25
Old sheet Monel	25 —30
Inconel clippings	30 —35
Nickel silver clippings, mixed	16 —18
Nickel silver turnings, mixed	15 —16

Lead

Soft scrap, lead	15¼—15¾
Battery plates (dry)	9 —9½

Magnesium

Segregated solids	9 —10
Castings	5½— 6½

Miscellaneous

Block tin	95 —100
No. 1 pewter	80 —85
No. 1 auto babbitt	75 —80
Mixed common babbitt	12¼—12½
Solder joints	23 —24
Siphon tops	75 —80
Small foundry type	18¼—18½
Monotype	16¾—17
Lino. and stereotype	16½—16¾
Electrotype	15 —15½
Hand picked type shells	11½—11¾
Lino. and stereo. dross	8¾— 9
Electro. dross	6¾— 7

SCRAP *iron and steel*

markets
prices
trends

Some centers report scrap movement pick-up, some still slow . . . Warmer weather is scrap man's ally . . . Detroit price change.

Some scrap centers showed optimism at the slight improvement in market movement while others stayed grim and wary of weak inventories. Warmer weather ahead has probably accounted for the quickening of collections and while Pittsburgh reported that mills continued their battle to maintain inventories, no mill was lagging on production. The hard-working scrap trade has better weather, its seasonal ally, on its side now.

For the time being scrap collections will improve and steelmakers may at least enter a source-to-furnace phase of supply. Whether scrap supply trouble is brewing for winter operations still remains to be seen.

From Price Director DiSalle came a report that no change is being considered in the scrap regulation to lump together openhearth and blast furnace grades of scrap under a single ceiling. Mr. DiSalle said that no formal request had been made for such an action and if made would require extensive study. If it did finally evolve, he concluded, it would probably result in a lower rather than higher ceiling.

OPS last week clarified the Detroit pricing muddle by fixing the basing point price at $41.15 for No. 1 steel, a $1.15 increase. The new price is subject to a 95¢ switching charge, making the price $40.20 on track.

PITTSBURGH—Milder weather has improved the flow of scrap into the yards. Public consciousness of the tight scrap situation is helping some, but the amount of scrap obtained from other-than-normal sources is scarcely perceptible. The mills are still straining to maintain inventories, but no one in this district seems to be losing production. Some foundries are operating hand-to-mouth. A large engineering company was forced to gather up scrap around its plant for shipment to a foundry producing urgently-needed castings.

CHICAGO—The slow movement of scrap into mills and the amounts being allocated to eastern districts is causing mill sources in the area to anticipate a severe shortage within 6 weeks to 2 months. However, some sources in the trade estimate it will hit earlier, possibly within 30 to 45 days. It is reported scrap will not be reallocated to district mills until they reach a 2-week inventory. A substantial portion of the railroad scrap normally bought in the area is going east. It is also felt railroads are not preparing as much scrap as before price ceilings. A considerable quantity of short shoveling turnings are reported being shipped into Canadian markets. Because of poor quality of some cast shipments, some foundries, when practicable, are buying No. 1 heavy melting steel instead.

PHILADELPHIA — While scrap consumers are still in poor shape, many are not dipping into inventories so heavily this week. Dealers are shipping as soon as they receive material and overgrading is not as prevalent. All mills in the district, with one exception, are now taking in truckloads of scrap. The sole exception will follow suit as soon as a scale can be completed for weighing the trucks.

NEW YORK—Movement of cast and scrap steel and iron was a shade freer this week. As one broker put it: "Mills are still tapping inventory but they seem to be assured a steady supply even if it may not prove fully adequate." The trade feels that warmer weather and resultant better collections may take some mills off the tenterhooks for a while.

DETROIT—The confused pricing situation in the Detroit area was clarified last week when a new OPS regulation was issued Mar. 27 fixing the basing point price of No. 1 heavy melting steel at $41.15 per gross ton. This price is subject to an arbitrary switching charge of 95¢, making the price $40.20 on track. According to OPS officials the price is not retroactive for the period Mar. 7 to Mar. 27. By the early part of the week some plants started issuing credits for shipments during that period. However, scrap movement in the area continued at a slow pace.

CLEVELAND—Consumers are hanging on grimly here and in the Valley this week and hoping for better weather which will permit more tonnage to be trucked into the yards. The better scrap, railroad and industrial, is all earmarked and collections will be a factor in any improvement in the supply picture. Dealers are crying for material to prepare, but the spread is too thin for either the trade or the consumers. Cast grades are very scarce.

ST. LOUIS—A slight improvement in the movement of scrap iron from rural areas into the St. Louis industrial district was reported as a result of more favorable weather. Supplies in hands of consumers continue low. Temporary halt in the dismantling of railroad equipment has slowed down their scrap shipments, all allocated. Some yard material is being allocated.

BIRMINGHAM — Cast scrap specialty items are coming into the district in fairly large quantities, but No. 1 cast still is exceptionally scarce and foundries have just about exhausted their supplies. Despite the need for this cast, apparently no gray market has developed thus far and purchasers seem determined to abide by government ceilings. Most steel items are in fair supply.

CINCINNATI—Demand is strong and supply weak in an unchanged market here. All consumers, mills and foundries, are hungry and cast grades are very tight. Mills are getting some allocations and inventories are disappearing in the face of a terrific melt. Dealers are shipping but yard inventories are poor. Some earmarked tonnage is moving out of the district.

BOSTON — Rumors that some scrap collectors are devoting a larger portion of their time to paper than to iron and steel are being heard. This change in activity is attributed by some for slow activity in the market this week.

BUFFALO — With reserves slashed sharply, leading mills here are awaiting the first arrival of scrap by water from upper Lake sections to avoid a drop in the ingot rate. Stocks of top mills have been pared and no improvement has been noted in the flow of materials. It is estimated mill stockpiles have dropped from about 240,000 tons to between 50,000 and 60,000 tons. New business has been limited to light tonnages.

Iron and Steel

SCRAP PRICES

(Maximum basing point prices, per gross ton, as set by OPS, effective Feb. 7, 1951. Shipping point and delivered prices calculated as shown below.)

Switching Charge (Dollars per gross ton) →	$0.99	.75	.53	.85	.75	.51	.75	.75	.51	.51	.75	.70	.76	.63	.65	.28	1.34	.79	.50	.20	.51	.51	.20	.52	.47	.51	.51	.51	.95	.50	.78	.50	.43	.31	.33	.57	.66	.65	.52	.66	.89
Basing Points →	Pittsburgh	Johnstown	Brackenridge	Butler	Midland	Meresen	Sharon	Youngstown	Canton	Steubenville	Warren	Weirton	Cleveland	Buffalo	Cincinnati	Middletown	Chicago	Claymont	Coatesville	Conshohocken	Harrieburg	Phoenixville	Sparrows Pt.	Bethlehem	Ashland, Ky.	Kokomo, Ind.	Portsmouth, O.	St. Louis	Detroit	Duluth	Kansas City	Birmingham	Alabama City	Atlanta	Minnequa	Houston	Los Angeles	Pittsburg, Cal.	Portland, Ore.	San Francisco	Seattle
GRADES OPS No.																																									
No. 1 heavy melting 1	$44.00							$44.00					$43.00				$42.50						$42.00					$41.00	$41.15	$40.00	$39 50	$39.00			$38.00	$37.00		$35.00				
No. 2 heavy melting 2	42.00							42.00					41.00				40.50						40.00					39.00	39.15	38.00	37.50	37.00			36.00	35.00		33.00				
No. 1 busheling 3	44.00							44.00					43.00				42.50						42.00					41.00	41.15	40.00	39.50	39.00			38.00	37.00		35.00				
No. 1 bundles 4	44.00							44.00					43.00				42.50						42.00					41.00	41.15	40.00	39.50	39.00			38.00	37.00		35.00				
No. 2 bundles 5	41.00							41.00					40.00				39.50						39.00					38.00	38.15	37.00	36.50	36.00			35.00	34.00		32.00				
Machine shop turnings 6	34.00							34.00					33.00				32.50						32.00					31.00	31.15	30.00	29.50	29.00			28.00	27.00		25.00				
Mixed borings and turnings 7	38.00							38.00					37.00				36.50						36.00					35.00	35.15	34.00	33.50	33.00			32.00	31.00		29.00				
Shovelling turnings 8	38.00							38.00					37.00				36.50						36.00					35.00	35.15	34.00	33.50	33.00			32.00	31.00		29.00				
Cast iron borings 10	38.00							38.00					37.00				36.50						36.00					35.00	35.15	34.00	33.50	33.00			32.00	31.00		29.00				
No. 1 chemical borings 26	41.00							41.00					40.00				39.50						39.00					38.00	38.15	37.00	36.50	36.00			35.00	34.00		32.00				
Forge crops 11	51.50							51.50					50.50				50.00						49.50					48.50	48.65	47.50	47.00	46.50			45.50	44.50		42.50				
Bar crops and plate 12	49.00							49.00					48.00				47.50						47.00					46.00	46.15	45.00	44.50	44.00			43.00	42.00		40.00				
Punchings and plate 14	46.50							46.50					45.50				45.00						44.50					43.50	43.65	42.50	42.00	41.50			40.50	39.50		37.50				
Electric furnace bundles 15	46.00							46.00					45.00				44.50						44.00					43.00	43.15	42.00	41.50	41.00			40.00	39.00		37.00				
Cut struct., plate, 3 ft and less 16	47.00							47.00					46.00				45.50						45.00					44.00	44.15	43.00	42.50	42.00			41.00	40.00		38 00				
Cut struct., plate, 2 ft and less 17	49.00							49.00					48.00				47.50						47.00					46.00	46.15	45.00	44.50	44.00			43.00	42.00		40.00				
Cut struct., plate, 1 ft and less 18	50.00							50.00					49.00				48.50						48.00					47.00	47.15	46.00	45.50	45.00			44.00	43.00		41.00				
Foundry steel, 2 ft and less 20	46.00							46.00					45.00				44.50						44.00					43.00	43.15	42.00	41.50	41.00			40.00	39.00		37.00				
Foundry steel, 1 ft and less 21	48.00							48.00					47.00				46.50						46.00					45.00	45.15	44.00	43.50	43.00			42.00	41.00		39.00				
Heavy trimmings 24	43.00							43.00					42.00				41.50						41.00					40.00	40.15	39.00	38.50	38.00			37.00	36.00		34.00				
No. 1 RR heavy melting RR 1	46.00							46.00					45.00				44.50						44.00					43.00	43.15	42.00	41.50	41.00			40.00	39.00		37.00				
Scrap rails, random lengths RR 14	48.00							48.00					47.00				46.50						46.00					45.00	45.15	44.00	43.50	43.00			42.00	41.00		39.00				
Scrap rails, 3 ft and less RR 16	51.00							51.00					50.00				49.50						49.00					48.00	48.15	47.00	46.50	46.00			45.00	44.00		42.00				
Scrap rails, 2 ft and less RR 17	52.00							52.00					51.00				50.50						50.00					49.00	49.15	48.00	47.50	47.00			46.00	45.00		43.00				
Scrap rails, 18 in. and less RR 18	54.00							54.00					53.00				52.50						52.00					51.00	51.15	50.00	49.50	49.00			48.00	47.00		45.00				
Rerolling rails RR 15	53.00							53.00					52.00				51.50						51.00					50.00	50.15	49.00	48.50	48.00			47.00	46.00		44.00				
Uncut tires RR 20	48.00							48.00					47.00				46.50						46.00					45.00	45.15	44.00	43.50	43.00			42.00	41.00		39.00				
Cut tires RR 21	51.00							51.00					50.00				49.50						49.00					48.00	48.15	47.00	46.50	46.00			45.00	44.00		42.00				
Cut bolsters and side frames RR 23	49.00							49.00					48.00				47.50						47.00					46.00	46.15	45.00	44.50	44.00			43.00	42.00		40.00				
RR specialties RR 24, 28, 29	51.00							51.00					50.00				49.50						49.00					48.00	48.15	47.00	46.50	46.00			45.00	44.00		42.00				
Solid steel axles RR 25	58.00							58.00					57.00				56.50						56.00					55.00	55.15	54.00	53.50	53.00			52.00	51.00		49.00				
No. 3 steel wheels RR 27	51.00							51.00					50.00				49.50						49.00					48.00	48.15	47.00	46.50	46.00			45.00	44.00		42.00				

Cast Scrap

(F.o.b. all shipping points)

Grades	OPS No.	
Cupola cast	1	$49.00
Charging box cast	2	47.00
Heavy breakable cast	3	45.00
Cast iron brake shoes	5	41.00
Stove plate	6	46.00
Clean auto cast	7	52.00
Unstripped motor blocks	8	43.00
Cast iron carwheels	9	47.00
Malleable	10	55.00
Drop broken mach'y. cast	11	52.00

SWITCHING DISTRICTS—These basing points include the indicated switching districts: Pittsburgh; Bessemer, Homestead, Duquesne, Munhall. Cincinnati; Newport. St. Louis; Granite City, East St. Louis, Madison. San Francisco; South San Francisco, Niles, Oakland. Claymont; Chester. Chicago; Gary. Los Angeles; Firestone.

SHIPPING POINT PRICES (Except RR scrap)—For shipping points within basing points, the ceiling shipping point price is the basing point price, less switching charge. The ceiling for shipping points outside basing points is the basing point price yielding the highest shipping point price, less the lowest established freight charge. Dock charge, where applicable, is $1.25 per gross ton except: Memphis, 95c; Great Lakes ports, $1.50, and New England ports, $1.75. Maximum shipping point price on No. 1 heavy melting steel in New York City is $36.99 per gross ton with set differentials for other grades. Hudson and Bergen County, N. J., shipping point prices are computed from Bethlehem basing point. All New Jersey computations use all-rail transport. Ceiling need not fall below $32 per gross ton for No. 1 heavy melting steel, with set differentials for other grades. Cast scrap shipping point prices are given in table.

DELIVERED PRICES (RR scrap)—Ceiling on-line price of a RR operating in a basing point is the top in the highest priced basing point in which the RR operates. For off-line prices, RR's not operating in basing point, non-operating RR's, and RR scrap sold by someone other than a RR see text of order, THE IRON AGE, Feb. 8, 1951, p. 137-C.

DELIVERED PRICES (Except RR scrap)—Ceiling is the shipping point price plus actual freight charge, tax included. Dock charges, where applicable, are as above.

UNPREPARED SCRAP—Ceiling price is $8 a ton less than prepared base grades (No. 1 heavy & No. 1 RR heavy). Scrap suitable for compressing into No. 1 bundles is $6 less than No. 1 bundles; suitable for compressing into No. 2 bundles, $8 less than No. 2 bundles. For cast material requiring special preparation, price is breakable cast less preparation costs.

COMMISSIONS—Brokers are permitted a maximum of $1 per gross ton commission which must be separate on the bill.

ALLOY PREMIUMS—These alloy extras are permitted: Nickel; $1.25 may be added to price of No. 1 heavy for each 0.25 pct nickel between 1 and 5.25 pct. **Molybdenum**; $2 may be added to price of No. 1 heavy for molybdenum over 0.15 pct, $3 for content over 0.65 pct. **Manganese**; $4 may be added to price of No. 1 heavy or No. 1 RR heavy for content over 10 pct if scrap is in sizes over 8 x 12 x 24 in., $14 if less than 8 x 12 x 24 in. Manganese premium applicable only if sold for electric furnace use or on NPA allocation. **Silicon**; electric furnace and foundry grade adjustments are not applicable if silicon content is between 0.5 and 1.75 pct. **Chromium**; $1 may be added if scrap conforms to SAE 52100 analysis and is to be used in an electric furnace. In no case is price to exceed No. 1 heavy by more than $1. **Multiple Alloys**; if scrap contains two premium alloy elements, total premium may not exceed ceiling premium for any one contained alloy.

RESTRICTONS ON USE—Ceiling prices on some scrap items may fluctuate with use by consumers. If some scrap is purchased for its established specialized use, the ceiling price set in the order stands. But if some special grades are purchased for other uses, the ceiling price charge shall be the price of the scrap grade being substituted. For example, the price established for Grade 28 (wrought iron) may be charged only when sold to a producer of wrought iron. Otherwise the ceiling price shall not exceed the ceiling price for the corresponding grade of basic openhearth. Restrictions on use are placed on the following grades: Chemical borings, wrought iron and rerolling rails. Ceiling prices on billet bloom and forge crops, alloy-free turnings, and heavy turnings may be charged only when shipped directly from industrial producer. NPA prohibits openhearth users from buying electric furnace grades, Nos. 11 through 18, foundry grades, Nos. 20 and 21 and cast grades, 1, 7, 9 and 11.

CEILING INTRANSIT PREPARATION CHARGES (Dollars per gross ton)

No. 1 heavy; No. 2 heavy; No. 1 RR heavy; No. 2 RR heavy; No. 1 busheling; No. 2 bundles; electric furnace bundles	$ 8.00
No. 1 bundles; briquetted turnings or cast iron borings; No. 1 RR sheet scrap	6.00
Crushing machine shop turnings	3.00
Bar crops and plate; punchings and plate; structural and plate, 1 ft & less, and 3 ft and less; foundry steel, 1 ft & less and 2 ft & less; wrought iron	10.00
Rails, 3 ft & less; cut tires; cut bolsters & side frames	4.00
Rails, 2 ft & less	5.00
Rails, 18 in. & less	7.00

OPS last week raised the Detroit basing point price on No. 1 heavy to $41.15—an $1.15 increase.

Hamilton, Ontario

(Consumers buying prices, del'd gross ton)

Hvy. melting steel	$30.00
No. 1 bundles	30.00
No. 2 bundles	29.50
Mechanical bundles	28.00
Mixed, steel scrap	26.00
Rails, remelting	30.00
Rails, rerolling	33.00
Bushelings	24.50
Bushelings, prepared new factory	28.00
Bushelings, unprepared new factory	23.00
Short steel turnings	23.00
Mixed borings, turnings	23.00
Cast scrap	48.00 to 50.00

MicroRold® 430 polished sheets now available

During the current critical nickel shortage, the same close tolerance and uniformity of gauge that have made MicroRold 18-8 so outstanding are now being incorporated in MicroRold 430.

It is important that the individual end use be discussed with your distributor or with our metallurgical department.

MicroRold 430 has moderate ductility, good forming and bending characteristics, and can be drawn to a *moderate* degree. It can be brazed and soldered with the same facility as chrome-nickel grades and except where resistance to high stresses is a major factor, it welds satisfactorily by the usual methods.

MicroRold 430 is used extensively for interior architectural trim, bar, restaurant and soda fountain components, table tops, etc. Washington Steel Corp. is currently producing polished sheets in standard sizes, 20 gauge and lighter, to replace chrome-nickel material vitally needed for the national defense program.

WASHINGTON STEEL CORPORATION

Washington, Pennsylvania

Comparison of Prices

Steel prices in this page are the average of various f.o.b. quotations of major producing areas: Pittsburgh, Chicago, Gary, Cleveland, Youngstown.

Flat-Rolled Steel: (cents per pound)	Apr. 3, 1951	Mar. 27, 1951	Mar. 6, 1951	Apr. 4 1950
Hot-rolled sheets	3.60	3.60	3.60	3.35
Cold-rolled sheets	4.35	4.35	4.35	4.10
Galvanized sheets (10 ga)	4.80	4.80	4.80	4.40
Hot-rolled strip	3.50	3.50	3.50	3.25
Cold-rolled strip	4.75	4.75	4.75	4.21
Plate	3.70	3.70	3.70	3.50
Plates wrought iron	7.85	7.85	7.85	7.85
Stains C-R-strip (No. 302)	36.50	36.50	36.50	33.00
Tin and Terneplate: (dollars per base box)				
Tinplate (1.50 lb) cokes.	$7.50	$7.50	$7.50	$7.50
Tinplate, electro (0.50 lb)	6.60	6.60	6.60	6.60
Special coated mfg. ternes	6.35	6.35	6.35	6.50
Bars and Shapes: (cents per pound)				
Merchant bars	3.70	3.70	3.70	3.45
Cold finished bars	4.55	4.55	4.55	*4.145
Alloy bars	4.30	4.30	4.30	3.95
Structural shapes	3.65	3.65	3.65	3.40
Stainless bars (No. 302)	31.25	31.25	31.25	28.50
Wrought iron bars	9.50	9.50	9.50	9.50
Wire: (cents per pound)				
Bright wire	4.85	4.85	4.85	4.50
Rails: (dollars per 100 lb)				
Heavy rails	$3.60	$3.60	$3.60	$3.40
Light rails	4.00	4.00	4.00	3.75
Semifinished Steel: (dollars per net ton)				
Rerolling billets	$56.00	$56.00	$56.00	$54.00
Slabs, rerolling	56.00	56.00	56.00	54.00
Forging billets	66.00	66.00	66.00	63.00
Alloy blooms billets, slabs	70.00	70.00	70.00	66.00
Wire Rod and Skelp: (cents per pound)				
Wire rods	4.10	4.10	4.10	3.85
Skelp	3.35	3.35	3.35	3.15

Price advances over previous week are printed in Heavy Type; declines appear in *Italics*

Pig Iron: (per gross ton)	Apr. 3, 1951	Mar. 27, 1951	Mar. 6, 1951	Apr. 4 1950
No. 2 foundry, del'd Phila.	$57.77	$57.77	$57.77	$50.42
No. 2, Valley furnace	52.50	52.50	52.50	46.50
No. 2, Southern Cin'ti	55.58	55.58	55.58	49.08
No. 2, Birmingham	48.88	48.88	48.88	42.38
No. 2, foundry, Chicago†	52.50	52.50	52.50	46.50
Basic del'd Philadelphia	56.92	56.92	56.92	49.92
Basic, Valley furnace	52.00	52.00	52.00	46.00
Malleable, Chicago†	52.50	52.50	52.50	46.50
Malleable, Valley	52.50	52.50	52.50	46.50
Charcoal, Chicago	70.56	70.56	70.56	68.56
Ferromanganese‡	186.25	186.25	186.25	173.40

†The switching charge for delivery to foundries in the Chicago district is $1 per ton.
‡Average of U. S. prices quoted on Ferroalloy page.

Scrap: (per gross ton)				
No. 1 steel, Pittsburgh	$44.00*	$44.00*	$44.00*	$32.75
No. 1 steel, Phila. area	42.50*	42.50*	42.50*	25.25
No. 1 steel, Chicago	42.50*	42.50*	42.50*	28.50
No. 1 bundles, Detroit	40.00*	40.00*	40.00*	26.75
Low phos. Young'n	46.50*	46.50*	46.50*	33.75
No. 1 cast, Pittsburgh	49.00†	49.00†	49.00†	39.50
No. 1 cast, Philadelphia	49.00†	49.00†	49.00†	36.50
No. 1 cast, Chicago	49.00†	49.00†	49.00†	40.50

*Basing Pt. †Shipping Pt.
Not including broker's fee after Feb. 7, 1951.

Coke: Connellsville: (per net ton at oven)				
Furnace coke, prompt	$14.75	$14.75	$14.25	$14.25
Foundry coke, prompt	17.75	17.75	17.25	16.25

Nonferrous Metals: (cents per pound to large buyers)				
Copper, electro, Conn.	24.50	24.50	24.50	18.50
Copper, Lake, Conn.	24.625	24.625	24.625	18.625
Tin, Straits, New York	$1.505	$1.34	$1.745	74.75
Zinc, East St. Louis	17.50	17.50	17.50	10.50
Lead, St. Louis	16.80	16.80	16.80	10.30
Aluminum, virgin	19.00	19.00	19.00	17.00
Nickel, electrolytic	53.55	53.55	53.55	42.97
Magnesium, ingot	24.50	24.50	24.50	20.50
Antimony, Laredo, Tex.	42.00	42.00	42.00	24.50

Composite Prices

Starting with the issue of May 12, 1949, the weighted finished steel composite was revised for the years 1941 to date. The weights used are based on the average product shipments for the 7 years 1937 to 1940 inclusive and 1946 to 1948 inclusive. The use of quarterly figures has been eliminated because it was too sensitive. (See p. 130 of May 12, 1949, issue.)

	Finished Steel Base Price	Pig Iron	Scrap Steel
Apr. 3, 1951	4.131¢ per lb.	$52.69 per gross ton	$43.00 per gross ton
One week ago	4.131¢ per lb.	52.69 per gross ton	43.00 per gross ton
One month ago	4.131¢ per lb.	52.69 per gross ton	43.00 per gross ton
One year ago	3.837¢ per lb.	46.38 per gross ton	28.83 per gross ton

	Finished Steel Base Price High		Finished Steel Base Price Low		Pig Iron High		Pig Iron Low		Scrap Steel High		Scrap Steel Low	
1951	4.131¢	Jan. 2	4.131¢	Jan. 2	$52.69	Jan. 2	$52.69	Jan. 2	$47.75	Jan. 30	$43.00	Feb. 7
1950	4.131¢	Dec. 1	3.837¢	Jan. 3	52.69	Dec. 12	45.88	Jan. 3	45.13	Dec. 19	26.25	Jan. 3
1949	3.837¢	Dec. 27	3.3705¢	May 3	46.87	Jan. 18	45.88	Sept. 6	43.00	Jan. 4	19.33	June 28
1948	3.721¢	July 27	3.193¢	Jan. 1	46.91	Oct. 12	39.58	Jan. 6	43.16	July 27	39.75	Mar. 9
1947	3.193¢	July 29	2.848¢	Jan. 1	37.98	Dec. 30	30.14	Jan. 7	42.58	Oct. 28	29.50	May 20
1946	2.848¢	Dec. 31	2.464¢	Jan. 1	30.14	Dec. 10	25.37	Jan. 1	31.17	Dec. 24	19.17	Jan. 1
1945	2.464¢	May 29	2.396¢	Jan. 1	25.37	Oct. 23	23.61	Jan. 2	19.17	Jan. 2	18.92	May 22
1944	2.396¢		2.396¢		$23.61		$23.61		19.17	Jan. 11	15.76	Oct. 24
1943	2.396¢		2.396¢		23.61		23.61		$19.17		$19.17	
1942	2.396¢		2.396¢		23.61		23.61		19.17		19.17	
1941	2.396¢		2.396¢		$23.61	Mar. 20	$23.45	Jan. 2	$22.00	Jan. 7	$19.17	Apr. 15
1940	2.30467¢	Jan. 2	2.24107¢	Apr. 16	23.45	Dec. 23	22.61	Jan. 2	21.83	Dec. 30	16.04	Apr. 9
1939	2.35367¢	Jan. 3	2.26689¢	May 16	22.61	Sept. 19	20.61	Sept. 12	22.50	Oct. 3	14.08	May 16
1838	2.58414¢	Jan. 4	2.27207¢	Oct. 18	23.25	June 21	19.61	July 6	15.00	Nov. 22	11.00	June 7
1937	2.58414¢	Mar. 9	2.32263¢	Jan. 4	32.25	Mar. 9	20.25	Feb. 16	21.92	Mar. 30	12.67	June 9
1936	2.32263¢	Dec. 28	2.05200¢	Mar. 10	19.74	Nov. 24	18.73	Aug. 11	17.75	Dec. 21	12.67	June 8
1932	1.89196¢	July 5	1.83910¢	Mar. 1	14.81	Jan. 5	13.56	Dec. 6	8.50	Jan. 12	6.43	July 5
1929	2.31773¢	May 28	2.26498¢	Oct. 29	18.71	May 14	18.21	Dec. 17	17.58	Jan. 29	14.08	Dec. 8

Weighted index based on steel bars, shapes, plates, wire, rails, black pipe, hot and cold-rolled sheets and strips, representing major portion of finished steel shipment. Index recapitulated in Aug. 28, 1941, issue and in May 12, 1949.

Based on averages for basic iron at Valley furnaces and foundry iron at Chicago, Philadelphia, Buffalo, Valley and Birmingham.

Average of No. 1 heavy melting steel scrap delivered to consumers at Pittsburgh, Philadelphia and Chicago.

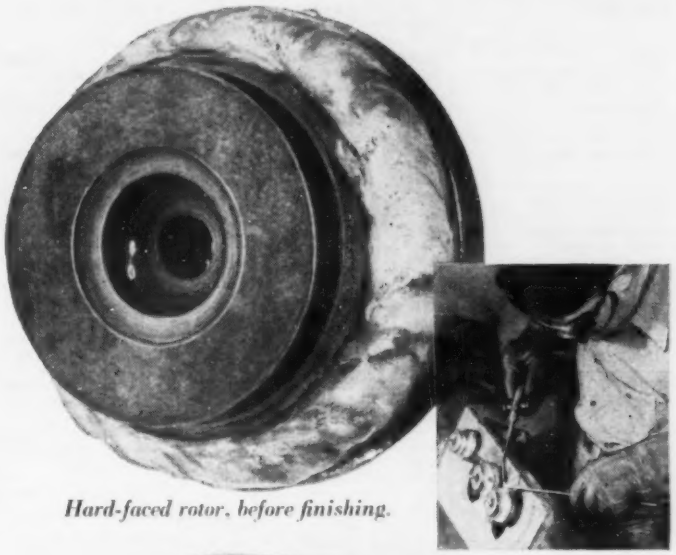
DOUBLES LIFE OF MIXER PARTS

...tough base metal withstands SHOCK
...hard-faced surfaces resist ABRASION and CORROSION

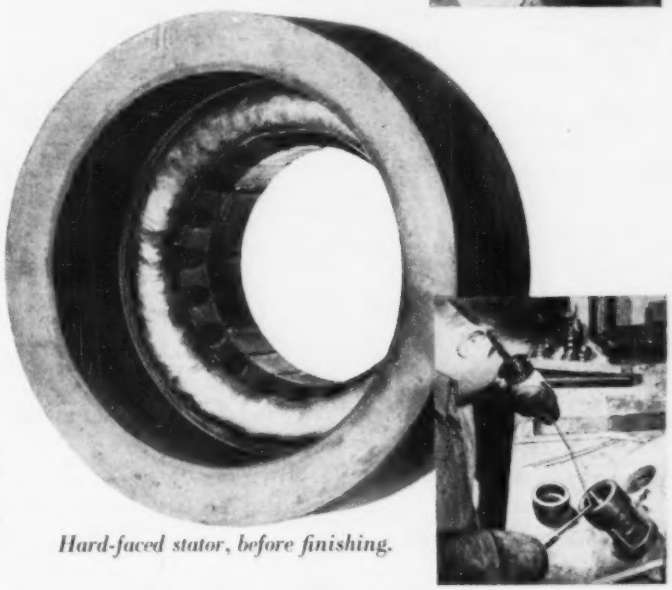
Here is another example of how hard-facing eliminates the need for a compromise when both hardness and toughness are needed for a particular part. This rotor and stator for a homogenizing machine are made from a tough base metal—Type 303 stainless steel. The bearing surfaces of the two parts are hard-faced with HAYNES STELLITE cobalt-base alloy. The parts are tough enough to stand up under the shock of pulverizing operations at high speeds . . . and yet the working surfaces are hard enough to resist the abrasive and corrosive effects of the materials being mixed.

For two years, no machine equipped with hard-faced parts has been returned or serviced because of rotor or stator failure. The heat-treated parts formerly used on these machines failed after only a year's service. The heat-treatment affected the corrosion resistance of the metal and also made the blades on the rotor too brittle.

For the whole story on hard-facing, including detailed procedures for applying various HAYNES alloys to wearing surfaces, write for the new 40-page booklet, "HAYNES Alloys—Hard-Facing Manual."



Hard-faced rotor, before finishing.



Hard-faced stator, before finishing.

Hard-facing doubles the life of these mixing-machine parts. In operation, they run with very close clearance at speeds of at least 3600 revolutions per minute. The clearance between the hard-faced bearing surfaces is filled in with the abrasive mixture.

HAYNES alloys

TRADE-MARK

"Haynes" and "Haynes Stellite" are trade-marks of Union Carbide and Carbon Corporation.

Haynes Stellite Company
A Division of
Union Carbide and Carbon Corporation
UCC
General Offices and Works, Kokomo, Indiana
Sales Offices
Chicago — Cleveland — Detroit — Houston
Los Angeles—New York—San Francisco—Tulsa

STEEL PRICES

Smaller numbers in price boxes indicate producing companies. For main office locations, see key on facing page.
Base prices at producing points apply only to sizes and grades produced in these areas. Prices are in cents per lb unless otherwise noted. Extras apply.

	Pittsburgh	Chicago	Gary	Cleveland	Canton Massillon	Middletown	Youngstown	Bethlehem	Buffalo	Conshohocken	Johnstown	Sparrows Point	Granite City	Detroit
INGOTS Carbon forging, net ton	$52.00[1]													
Alloy, net ton	$54.00[1,17]													$54.00[31]
BILLETS, BLOOMS, SLABS Carbon, rerolling, net ton	$56.00[1,5]	$56.00[1]	$56.00[1]						$56.00[3]		$56.00[3]			
Carbon forging billets, net ton	$66.00[1,5]	$66.00[1,4]	$66.00[1]	$66.00[4]	$66.00[4]				$66.00[3,4]	$73.00[26]	$66.00[3]			$69.00[31]
Alloy, net ton	$70.00[1,17,6]	$70.00[1,4]	$70.00[1,6]		$70.00[4]			$70.00[3]	$70.00[3,4]	$77.00[26]	$70.00[3]			$73.00[31]
PIPE SKELP	3.35[1] 3.45[5]						3.35[1,4]							
WIRE RODS	4.10[2] 4.30[18]	4.10[2,4,33]	4.10[6]	4.10[2]			4.10[6]		4.10[85]		4.10[3]	4.20[3]		
SHEETS Hot-rolled (18 ga. & hvr.)	3.60[1,5,9,15] 3.75[28]	3.60[8,23]	3.60[1,6,8]	3.60[4,5]		3.60[7]	3.60[1,4,6] 4.00[13]		3.60[3]	4.00[26]		3.60[3]	4.30[22]	3.80[12] 4.40[47]
Cold-rolled	4.35[1,5,9,15,7]		4.35[1,6,8]	4.35[4,5]		4.35[7]	4.35[4,6]		4.35[3]			4.35[3]	5.05[22]	4.55[12]
Galvanized (10 gage)	4.80[1,9,15]		4.80[1,8]		4.80[4]	4.80[7]	5.50[44] 6.00[64]					4.80[3]	5.50[22]	
Enameling (12 gage)	4.65[1]		4.65[1,8]	4.65[4]		4.65[7]	4.65[6]						5.35[22]	
Long terne (10 gage)	5.20[9,15]		5.20[1]			5.20[7]	6.00[64]							
Hi str. low alloy, h.r.	5.40[1,5] 5.75[9]	5.40[1]	5.40[1,8] 5.90[6]	5.40[4,5]			5.40[1,4,13] 5.90[6]		5.40[3]	5.65[26]		5.40[3]		5.95[12]
Hi str. low alloy, c.r.	6.55[1,5] 6.90[9]		6.55[1,8] 7.05[6]	6.55[4,5]			6.55[4] 7.05[6]		6.55[3]			6.55[3]		7.10[12]
Hi str. low alloy, galv.	7.20[1]											6.75[3]		
STRIP Hot-rolled	3.60[9], 4.00[11,58], 3.75[28] 3.50[5,7]	3.50[66]	3.50[1,6,8]			3.50[7]	3.50[1,4,6] 4.00[13]		3.50[3,4]	3.90[26]	3.50[3]	3.50[3]		4.40[47] 3.80[12]
Cold-rolled	4.65[5,7,9] 5.00[28] 5.35[40,63,58]	4.90[8,66]	4.90[8]	4.65[2,5]		4.65[7]	4.65[1,6] 5.25[28,49] 5.35[13,40]		4.65[3]			4.65[3]		4.85[12] 5.45[47] 5.60[58,81]
Hi str. low alloy, h.r.	5.75[9]		5.50[1] 5.30[8], 5.80[6]				4.95[4], 5.50[1] 5.40[13], 5.80[6]		4.95[3]	5.55[26]		4.95[3]		5.95[12]
Hi str. low alloy, c.r.	7.20[9]			6.55[2] 6.70[5]			(6.20[4], 6.55[13] 7.05[6]		6.40[3]			6.40[3]		
TINPLATE† Cokes, 1.25-lb base box (1.50 lb, add 25¢)	$8.45[1,5,9,15]		$8.45[1,6,8]				$8.45[4]					$8.55[3]		
Electrolytic 0.25, 0.50, 0.75 lb box	0.25 lb base box, $7.15[1,4,5,8,9]; $7.25[3,11]; $7.35[22] 0.50 lb, add 25¢; 0.75 lb add 65¢													
BLACKPLATE, 29 gage Hollowware enameling	5.85[1] 6.15[15]		5.85[1]				5.30[4]							
BARS Carbon steel	3.70[1,5] 3.85[9]	3.70[1,4,23]	3.70[1,4,6,8]	3.70[4]	3.70[4]		3.70[1,4,6]		3.70[3,4]		3.70[3]			3.85[31]
Reinforcing	3.70[1,5]	3.70[4]	3.70[1,6,8]	3.70[4]			3.70[1,4,6]		3.70[3,4]		3.70[3]	3.70[3]		
Cold-finished	4.55[2,4,5,52,69,71]	4.55[2,23,70]	4.55[4,74,73]	4.55[2]	4.55[4,82]		4.55[6,57]		4.60[70]					4.70[31]
Alloy, hot-rolled	4.30[1,17]	4.30[1,4,23]	4.30[1,6,8]		4.30[4]		4.30[1,6]	4.30[8]	4.30[3,4]		4.30[3]			4.45[31] 4.65[12]
Alloy, cold-drawn	5.40[17,52,69,71,2]	5.40[4,23,69,70,73] 5.45[2]	5.40[4,73,74]		5.40[4,32]		5.40[6,25,57]	5.40[3]	5.40[3]					5.55[31]
Hi str. low alloy, h.r.	5.55[1,5]		5.55[1,8] 6.05[6]	5.55[4,5]			5.55[1] 6.05[6]	5.55[3]	5.55[3]		5.55[3]			
PLATE Carbon steel	3.70[1,5,15] 4.00[9]	3.70[1,23]	3.70[1,6,8]	3.70[4,5]			3.70[1,4,6] 3.95[13]		3.70[3]	4.15[26]	3.70[3]	3.70[3]	4.40[22]	
Floor plates	4.75[1]	4.75[1]	4.75[8]	4.75[5]						4.75[26]				
Alloy	4.75[1]	4.75[1]	4.75[1]				5.20[13]			5.05[26]	4.75[3]	4.75[3]		
Hi str. low alloy	5.65[1,5]	5.65[1]	5.65[1,8] 6.15[6]	5.65[4,5]			5.65[4] 5.70[13] 6.15[6]			5.90[26]	5.65[3]	5.65[3]		
SHAPES, Structural	3.65[1,5] 3.90[9]	3.65[1,23]	3.65[1,8]					3.70[3]	3.70[3]		3.70[3]			
Hi str. low alloy	5.50[1,5]	5.50[1]	5.50[1,8] 6.00[6]				6.00[6]	5.50[3]	5.50[3]		5.50[3]			
MANUFACTURERS' WIRE Bright	4.85[2,5] 5.10[18]	4.85[2] 4.33,34		4.85[2]			4.85[6]	Kokomo = 4.95[10] 4.85[85]			4.85[3]	4.95[3]	Duluth = 4.85[3]	
PILING, Steel Sheet	4.45[1]	4.45[1]	4.45[8]						4.45[3]					

STEEL PRICES

Smaller numbers indicate producing companies. See key at right.
Prices are in cents per lb unless otherwise noted. Extras apply.

Kansas City	Houston	Birmingham	WEST COAST Seattle, San Francisco, Los Angeles, Fontana		
			F=$79.00[19]		INGOTS Carbon forging, net ton
	$62.00[83]		F=$80.00[19]		Alloy, net ton
		$58.00[11]	F=$75.00[19]		BILLETS, BLOOMS, SLABS Carbon, rerolling, net ton
	$74.00[83]	$66.00[11]	F=$85.00[19] SF, LS, S=$85.00[62]	Geneva=$66.00[16]	Carbon forging billets, net ton
	$78.00[83]		F=$89.00[19] LA=$90.00[62]		Alloy net ton
					PIPE SKELP
	4.50[83]	4.10[4,11]	SF=4.90[2], F=4.90[19] LA=4.90[24,62]	Worcester=4.40[2] Minnequa=4.35[14] Portsmouth=4.30[20]	WIRE RODS
		3.60[4,11]	SF, LA=4.30[24] F=4.55[19]	Niles=5.25[64], Geneva=3.70[16] Ashland=3.60[7]	SHEETS Hot-rolled (18 ga. & hvr.)
		4.35[11]	SF=5.30[24] F=5.30[19]		Cold-rolled
		4.80[4,11]	SF, LA=5.55[24]	Ashland=4.80[7] Kokomo=5.20[30]	Galvanized (10 gage)
				Ashland=4.65[7]	Enameling (12 gage)
					Long ternes (10 gage)
		5.40[11]	F=6.35[19]		Hi str. low alloy, h.r.
			F=7.50[19]		Hi str. low alloy, c.r.
					Hi str. low alloy, galv.
4.10[83]	4.90[83]	3.50[4,11]	SF, LA=4.25[24,62] F=4.75[19], S=4.50[62]	Atlanta=4.05[65] Minnequa=4.55[14] Ashland=3.50[7]	STRIP Hot-rolled
			F=6.30[19] LA=6.40[27]	New Haven=5.15[2], 5.85[68] Trenton=6.00[45]	Cold-rolled
		5.30[11]	F=6.20[19] SF, LA=6.05[62] S=6.30[62]		Hi str. low alloy, h.r.
			F=6.95[19]		Hi str. low alloy, c.r.
		$8.55[11]	SF=9.20[24]		TINPLATE Cokes, 1.25-lb base box (1.50 lb, add 25¢)
					Electrolytic 0.25, 0.50, 0.75 lb box
					BLACKPLATE, 29 gage Hollowware enameling
4.30[83]	4.10[83]	3.70[4,11]	SF, LA=4.40[24]	Atlanta=4.25[65] Minnequa=4.15[14]	BARS Carbon steel
4.30[83]	4.10[83]	3.70[4,11]	SF, S=4.45[62] F=4.40[19], LA=4.40[62]	Atlanta=4.25[65] Minnequa=4.50[14]	Reinforcing
			LA=6.00[4]	Newark=5.00[69] Putnam=5.10[69] Hartford=5.10[4]	Cold-finished
4.90[83]	4.70[83]		LA=5.35[62] F=5.35[19]		Alloy, hot-rolled
				Newark=5.75[69] Worcester=5.75[2] Hartford=5.85[4]	Alloy, cold-drawn
		5.55[11]	F=6.60[19] SF, S=6.30[62] LA=6.25[62]		Hi str. low alloy, h.r.
	4.10[83]	3.70[4,11]	F=4.30[19] S=4.60[62]	Claymont=4.15[29] Coatesville=4.15[21] Minnequa=4.50[14] Geneva=3.70[16]	PLATE Carbon steel
				Harrisburg=5.25[35]	Floor plates
			F=5.70[19]	Coatesville=5.25[21] Claymont=4.85[29]	Alloy
		5.65[11]	F=6.25[19] S=6.55[62]	Geneva=5.65[16]	Hi str. low alloy
4.25[83]	4.05[83]	3.60[4] 3.65[11]	SF=4.20[62] F=4.25[16] LA=4.25[24,62] S=4.30[62]	Geneva 3.65[16] Minnequa 4.10[14]	SHAPES, Structural
		5.50[11]	SF=6.10[62,19] SF=6.00[62] LA=6.05[62]	Geneva=5.50[16]	Si str. low alloy
5.45[83]	5.25[83]	4.85[4,11]	SF, LA=5.80[24]	Atlanta=5.10[65] Worcester=5.15[2] Minnequa=5.10[14] Portsmouth=5.25[20]	MANUFACTURERS' WIRE Bright

Key to Steel Producers

1 U. S. Steel Co., Pittsburgh
2 American Steel & Wire Co., Cleveland
3 Bethlehem Steel Co., Bethlehem
4 Republic Steel Corp., Cleveland
5 Jones & Laughlin Steel Corp., Pittsburgh
6 Youngstown Sheet & Tube Co., Youngstown
7 Armco Steel Corp., Middletown, Ohio
8 Inland Steel Co., Chicago
9 Weirton Steel Co., Weirton, W. Va.
10 National Tube Co., Pittsburgh
11 Tennessee Coal, Iron & R. R. Co., Birmingham
12 Great Lakes Steel Corp., Detroit
13 Sharon Steel Corp., Sharon, Pa.
14 Colorado Fuel & Iron Corp., Denver
15 Wheeling Steel Corp., Wheeling, W. Va.
16 Geneva Steel Co., Salt Lake City
17 Crucible Steel Co. of America, New York
18 Pittsburgh Steel Co., Pittsburgh
19 Kaiser Steel Corp., Oakland, Calif.
20 Portsmouth Div., Detroit Steel Corp., Detroit
21 Lukens Steel Co., Coatesville, Pa.
22 Granite City Steel Co., Granite City, Ill.
23 Wisconsin Steel Co., South Chicago, Ill.
24 Columbia Steel Co., San Francisco
25 Copperweld Steel Co., Glassport, Pa.
26 Alan Wood Steel Co., Conshohocken, Pa.
27 Calif. Cold Rolled Steel Corp., Los Angeles
28 Allegheny Ludlum Steel Corp., Pittsburgh
29 Claymont Steel Corp., Claymont, Del.
30 Continental Steel Corp., Kokomo, Ind.
31 Rotary Electric Steel Co., Detroit
32 Laclede Steel Co., St. Louis
33 Northwestern Steel & Wire Co., Sterling, Ill.
34 Keystone Steel & Wire Co., Peoria, Ill.
35 Central Steel & Wire Co., Harrisburg, Pa.
36 Carpenter Steel Co., Reading, Pa.
37 Eastern Stainless Steel Corp., Baltimore
38 Washington Steel Corp., Washington, Pa.
39 Jessop Steel Co., Washington, Pa.
40 Blair Strip Steel Co., New Castle, Pa.
41 Superior Steel Corp., Carnegie, Pa.
42 Timken Steel & Tube Div., Canton, Ohio
43 Babcock & Wilcox Tube Co., Beaver Falls, Pa.
44 Reeves Steel & Mfg. Co., Dover, Ohio
45 John A. Roebling's Sons Co., Trenton, N. J.
46 Simonds Saw & Steel Co., Fitchburg, Mass.
47 McLouth Steel Corp., Detroit
48 Cold Metal Products Co., Youngstown
49 Thomas Steel Co., Warren, Ohio
50 Wilson Steel & Wire Co., Chicago
51 Sweet's Steel Co., Williamsport, Pa.
52 Superior Drawn Steel Co., Monaca, Pa.
53 Tremont Nail Co., Wareham, Mass.
54 Firth Sterling St. & Carbide Corp., McKeesport
55 Ingersoll Steel Div., Chicago
56 Phoenix Iron & Steel Co., Phoenixville, Pa.
57 Fitzsimons Steel Co., Youngstown
58 Stanley Works, New Britain, Conn.
59 Universal-Cyclops Steel Corp., Bridgeville, Pa.
60 American Cladmetals Co., Carnegie, Pa.
61 Cuyahoga Steel & Wire Co., Cleveland
62 Bethlehem Pacific Coast Steel Corp., San Fran.
63 Follansbee Steel Corp., Pittsburgh
64 Niles Rolling Mill Co., Niles, Ohio
65 Atlantic Steel Co., Atlanta
66 Acme Steel Co., Chicago
67 Joslyn Mfg. & Supply Co., Chicago
68 Detroit Steel Corp., Detroit
69 Wycoff Steel Co., Pittsburgh
70 Bliss & Laughlin, Inc., Harvey, Ill.
71 Columbia Steel & Shafting Co., Pittsburgh
72 Cumberland Steel Co., Cumberland, Md.
73 La Salle Steel Co., Chicago
74 Monarch Steel Co., Inc., Hammond, Ind.
75 Empire Steel Co., Mansfield, Ohio
76 Mahoning Valley Steel Co., Niles, Ohio
77 Oliver Iron & Steel Co., Pittsburgh
78 Pittsburgh Screw & Bolt Co., Pittsburgh
79 Standard Forging Corp., Chicago
80 Driver Harris Co., Harrison, N. J.
81 Detroit Tube & Steel Div., Detroit
82 Reliance Div., Eaton Mfg. Co., Massillon, Ohio
83 Sheffield Steel Corp., Kansas City
84 Plymouth Steel Co., Detroit
85 Wickwire Spencer Steel, Buffalo
86 Angell Nail and Chaplet, Cleveland
87 Mid-States Steel & Wire, Crawfordsville, Ind.
88 National Supply, Pittsburgh, Pa.
89 Wheatland Tube Co., Wheatland, Pa.
90 Mercer Tube & Mfg. Co., Sharon, Pa.
91 Woodward Iron Co., Woodward, Ala.
92 Sloss-Sheffield Steel & Iron Co., Birmingham
93 Hanna Furnace Corp., Detroit
94 Interlake Iron Corp., Cleveland
95 Lone Star Steel Co., Dallas
96 Mystic Iron Works, Everett, Mass.
97 Jackson Iron & Steel Co., Jackson, O.
98 Globe Iron Co., Jackson, O.
99 Pittsburgh Coke & Chemical Co., Pittsburgh
100 Shenango Furnace Co., Pittsburgh
101 Tennessee Products & Chem. Corp., Nashville
102 Koppers Co., Inc., Granite City, Ill.
103 Page Steel & Wire Div., American Chain & Cable, Monessen, Pa.
104 Wallingford Steel Co., Wallingford, Conn.

STAINLESS STEELS

Base price, cents per lb, f.o.b. mill.

Product	301	302	303	304	316	321	347	410	416	430
Ingots, rerolling	14.25	15.00	16.50	16.00	24.25	19.75	21.50	12.75	14.75	13.00
Slabs, billets rerolling	16.50	19.75	21.75	20.75	31.75	26.00	28.25	16.50	20.00	16.75
Forg. discs, die blocks, rings	34.00	34.00	36.50	35.50	52.50	40.00	44.50	26.00	26.50	26.50
Billets, forging	26.25	26.25	28.25	27.50	41.00	31.00	34.75	21.50	22.00	22.00
Bars, wires, structurals	31.25	31.25	33.75	32.75	48.75	38.75	41.25	25.75	26.25	26.25
Plates	33.00	33.00	35.00	35.00	51.50	40.50	45.00	27.00	27.50	27.50
Sheets	41.00	41.00	43.00	43.00	56.50	49.00	53.50	36.50	37.00	39.00
Strip, hot-rolled	26.50	28.00	32.25	30.00	48.25	36.75	41.00	23.50	30.25	24.00
Strip, cold-rolled	34.00	36.50	40.00	38.50	58.50	48.00	52.00	30.50	37.00	31.00

STAINLESS STEEL PRODUCING POINTS—*Sheets:* Midland, Pa., 17; Brackenridge, Pa., 28; Butler, Pa., 7; McKeesport, Pa., 1; Washington, Pa., 38 (type 316 add 5¢), 39; Baltimore, 37; Middletown, Ohio, 7; Massillon, Ohio, 4; Gary, 1; Bridgeville, Pa., 59; New Castle, Ind., 55; Ft. Wayne, Ind., 67; Lockport, N. Y., 45.

Strip: Midland, Pa., 17; Cleveland, 2; Carnegie, Pa., 41; McKeesport, Pa., 54; Reading, Pa., 36; Washington, Pa., 38 (type 316 add 5¢); W. Leechburg, Pa., 28; Bridgeville, Pa., 59; Detroit, 47; Massillon, Canton, Ohio, 4; Middletown, Ohio, 7; Harrison, N. J., 80; Youngstown, 48; Lockport, N. Y., 46; New Britain, Conn., 58; Sharon, Pa., 13; Butler, Pa., 7; Wallingford, Conn., 104.

Bars: Baltimore, 7; Duquesne, Pa., 1; Munhall, Pa., 1; Reading, Pa., 36; Titusville, Pa., 59; Washington, Pa., 39; McKeesport, Pa., 1, 54; Bridgeville, Pa., 59; Dunkirk, N. Y., 28; Massillon, Ohio, 4; Chicago, 1; Syracuse, N. Y., 17; Watervliet, N. Y., 28; Waukegan, Ill., 2; Lockport, N. Y., 46; Canton, Ohio, 42; Ft. Wayne, Ind., 67.

Wire: Waukegan, Ill., 2; Massillon, Ohio, 4; McKeesport, Pa., 54; Bridgeport, Conn., 44; Ft. Wayne, Ind., 67; Trenton, N. J., 45; Harrison, N. J., 80; Baltimore, 7; Dunkirk, 28; Monessen, 103; Syracuse, N. Y., 17; Bridgeville, Pa., 59.

Structurals: Baltimore, 7; Massillon, Ohio, 4; Chicago, 1, 67; Watervliet, N. Y., 28; Bridgeport, Conn., 44; Syracuse, N. Y., 17.

Plates: Brackenridge, Pa., 28 (type 416 add ½¢); Butler, Pa., 7; Chicago, 1; Munhall, Pa., 1; Midland, Pa., 17; New Castle, Ind., 55; Lockport, N. Y., 46; Middletown, 7; Washington, Pa., 39; Cleveland, Massillon, 4.

Forged discs, die blocks, rings: Pittsburgh, 1, 17; Syracuse, 17; Ferndale, Mich., 28; Washington, Pa., 39.

Forging billets: Midland, Pa., 17; Baltimore, 7; Washington, Pa., 39; McKeesport, 54; Massillon, Canton, Ohio, 4; Watervliet, 28; Pittsburgh, Chicago, 1; Syracuse, N. Y., 17.

RAILS, TRACK SUPPLIES

F.o.b. Mill Cents Per Lb	No. 1 Std. Rails	Light Rails	Joint Bars	Track Spikes	Axles	Screw Spikes	Tie Plates	Track Bolts Treated
Bessemer-1	3.60	4.00	4.70					
Chicago-4				6.15				
Ensley-11	3.60	4.00						
Fairfield-11		4.00	4.40			8.60	4.50	
Gary-1	3.60	4.00					4.50	
Ind. Harbor-8	3.60		4.70	6.15	5.60	8.60	4.50	
Johnstown-3		4.00			5.60	8.60		
Joliet-1		4.00	4.70					
Kansas City-83				6.40				9.80
Lackawanna-3	3.60	4.00	4.70			8.60	4.50	
Lebanon-3				6.15				9.80
Minnequa-14	3.60	4.50	4.70	6.15		8.60	4.50	9.80
Pittsburgh-77						9.35		9.85
Pittsburgh-78								9.85
Pittsburgh-5				6.15				
Pittsburg-24							4.65	
Seattle-62				6.65			4.65	
Steelton-3	3.60		4.70				4.50	
Struthers-6				6.15				
Torrance-24							4.65	
Youngstown-4				6.15				

BOILER TUBES

$ Per 100 ft., cut, 10 to 24 ft.

F.o.b. Mill	Size		Seamless		Elec. Weld	
	Od-In.	B. W. Ga.	H. R.	C.D.	H. R.	C.D.
Babcock & Wilcox	2	13	22.67	26.66	21.99	25.86
	2½	12	30.48	35.84	29.57	34.78
	3	12	33.90	39.90	32.89	38.70
	3½	11	42.37	49.89	41.10	48.39
	4	10	52.60	61.88	51.03	60.02
National Tube	2	13	21.62	26.48		
	2½	12	29.65	36.32		
	3	12	34.00	41.64		
	3½	11	40.34	49.41		
	4	10	51.21	62.72		
Pittsburgh Steel	2	13		27.08		
	2½	12	30.49	37.15		
	3	12	34.95	42.59		
	3½	11	41.48	50.54		
	4	10	52.65	64.16		

FLUORSPAR

Washed gravel, f.o.b. Rosiclaire, Ill. Price, net ton: Effective CaF_2 content:
70% or more $43.00
60% or less 40.00

MERCHANT WIRE PRODUCTS

F.o.b. Mill	Standard & Coated Nails Base Col.	Woven Wire Fence 9-15½ ga. Base Col.	Fence Posts Base Col.	Single Loop Bale Ties Base Col.	Twisted Barbless Wire Base Col.	Galv. Barbed Wire Base Col.	Merch. Wire Annld ¢/lb.	Merch. Wire Galv. (1) ¢/lb.
Alabama City-4	118	126	....	123	....	136	5.70	5.95
Aliquippa, Pa.-5	118	132	....	....	136	140	5.70	6.15
Atlanta-65	121	133	....	126	126	143	5.95	6.40
Bartonville-34	118	130	....	123	143	143	5.70	6.15
Buffalo-85	....	....	....	....	....	....	4.85	....
Cleveland-86	125	....	....	....	....	....	....	....
Cleveland-2	....	....	....	....	....	....	5.70	6.15
Crawfordsville-87	....	132	....	....	....	145	5.95	6.40
Donora, Pa.-2	118	130	....	123	140	140	5.70	6.15
Duluth-2	118	130	....	123	14u	140	5.70	6.15
Fairfield, Ala.-11	118	130	....	123	....	140	5.70	6.15
Houston-83	128	138	....	....	....	148	6.10	6.55
Johnstown, Pa.-3	118	130	....	....	140	....	5.70	6.15
Joliet, Ill.2	118	130	....	123	....	140	5.70	6.15
Kokomo, Ind.-30	120	132	....	125	138	142	5.80	6.05
Los Angeles-62	....	....	....	....	....	....	6.65	....
Kansas City-83	130	....	....	135	....	152	6.30	6.75
Minnequa-14	123	138	130	128	146	146	5.95	6.45
Monessen-18	124	135	....	....	....	145	5.95	6.40
Moline, Ill.-4	....	....	136	....	....	....	....	....
Pittsburg, Cal.-24	137	....	....	147	156	160	6.65	6.80
Portsmouth-20	124	137	....	....	147	147	6.10	6.60
Rankin, Pa.-2	118	130	....	....	140	140	5.70	6.15
So. Chicago, Ill.-4	118	126	140	123	....	136	5.70	5.95
S. San Fran.-14	....	....	....	147	....	160	6.65	7.10
Sparrows Pt.-3	120	....	....	125	142	142	5.80	6.25
Sterling, Ill.-33	118	130	....	123	140	140	5.70	6.15
Struthers, Ohio-6	....	....	....	....	....	....	5.70	6.15
Torrance, Cal.-24	138	....	....	....	....	....	6.65	....
Worcester-2	124	....	....	....	....	....	6.00	6.45
Williamsport, Pa.-51	....	....	150	....	....	....	....	....

Cut Nails, carloads, base, $7.35 per 100 lb. (less 20¢ to jobbers), at Conshohocken, Pa., (26). Wheeling, W. Va., (15), $7.15.

(1) Alabama City and So. Chicago do not include zinc extra.

CAST IRON WATER PIPE

Per Net Ton

6 to 24-in., del'd Chicago. $105.30 to $108.80
6 to 24-in., del'd N. Y.... 108.50 to 109.50
6 to 24-in., Birmingham. 91.50 to 96.00
6-in. and larger, f.o.b. cars, San Francisco, Los Angeles, for all rail shipment; rail and water shipment less ..... $108.50 to $113.00
Class "A" and gas pipe, $5 extra; 4-in. pipe is $5 a ton above 6-in.

PIPE AND TUBING

Base discounts, f.o.b. mills. Base price about $200 per net ton.

	BUTTWELD														SEAMLESS					
	½ in.		¾ in.		1 in.		1¼ in.		1½ in.		2 in.		2½-3 in.		2 in.		2½-3 in.		3½-4 i	
	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.
STANDARD T & C.																				
Sparrows Pt.-3	34.0	12.0	37.0	16.0	39.5	19.5	40.0	20.0	40.5	21.0	41.0	21.5	41.5	22.0	....	....	....	....	....	....
Cleveland-4	36.0	14.0	39.0	18.0	41.5	21.5	42.9	22.0	42.5	23.0	43.0	23.5	43.5	24.0	....	....	....	....	....	....
Oakland-19	25.0	3.0	28.0	7.0	30.5	10.5	31.0	11.0	31.5	12.0	32.0	12.5	32.5	13.0	....	....	....	....	....	....
Pittsburgh-5	36.0	14.0	39.0	17.0	41.5	19.5	42.0	20.5	42.5	21.0	43.0	21.5	43.5	22.5	29.5	8.0	32.5	11.5	34.5	13.5
Pittsburgh-10	36.0	14.0	39.0	18.0	41.5	21.5	42.0	22.0	42.5	23.0	43.0	23.5	43.5	24.0	29.5	9.5	32.5	12.5	34.5	14.5
St. Louis-32	35.0	13.0	38.0	17.0	40.5	20.5	41.0	21.0	41.5	22.0	42.0	22.5	42.5	23.0	....	....	....	....	....	....
Sharon-90	36.0	13.0	39.0	17.0	41.5	20.0	42.0	20.5	42.5	21.0	43.0	21.5	43.5	22.0	....	....	....	....	....	....
Pittsburgh-88	36.0	14.0	39.0	18.0	41.5	21.5	42.0	22.0	42.5	23.0	43.0	23.5	43.5	24.0	29.5	....	32.5	....	34.5	....
Wheeling-15	36.0	14.0	39.0	18.0	41.5	21.5	42.0	22.0	42.5	23.0	43.0	23.5	43.5	24.0	....	....	....	....	....	....
Wheatland-89	36.0	14.0	39.0	17.0	41.5	19.5	42.0	20.5	42.5	21.0	43.0	21.5	43.5	22.5	....	....	....	....	....	....
Youngstown-6	36.0	14.0	39.0	18.0	41.5	21.5	42.0	22.0	42.5	23.0	43.0	23.5	43.5	24.0	29.5	9.5	32.5	12.5	34.5	14.5
EXTRA STRONG, PLAIN ENDS																				
Sparrows Pt.-3	33.5	13.0	37.5	17.0	39.5	20.5	40.0	21.0	40.5	22.0	41.0	22.5	41.5	23.0	....	....	....	....	....	....
Cleveland-4	35.5	15.0	39.5	19.0	41.5	22.5	42.0	23.0	42.5	24.0	43.0	24.5	43.5	25.0	....	....	....	....	....	....
Oakland-19	24.5	4.0	28.5	8.0	30.5	11.5	31.0	12.0	31.5	13.0	32.0	13.5	32.5	14.0	....	....	....	....	....	....
Pittsburgh-5	35.5	13.5	39.5	17.5	41.5	19.5	42.0	20.5	42.5	21.0	43.0	21.5	43.5	22.5	29.0	7.5	33.0	12.0	36.5	15.5
Pittsburgh-10	35.5	15.0	39.5	19.0	41.5	22.5	42.0	23.0	42.5	24.0	43.0	24.5	43.5	25.0	29.0	10.0	33.0	14.0	36.5	17.5
St. Louis-32	34.5	14.0	38.5	18.0	40.5	21.5	41.0	22.0	41.5	23.0	42.0	23.5	42.5	24.0	....	....	....	....	....	....
Sharon-90	35.5	14.0	39.5	18.0	41.5	21.0	42.0	21.5	42.5	22.0	43.0	22.5	43.5	23.0	....	....	....	....	....	....
Pittsburgh-88	35.5	15.0	39.5	19.0	41.5	22.5	42.0	23.0	42.5	24.0	43.0	24.5	43.5	25.0	29.0	....	33.0	....	36.5	....
Wheeling-15	35.5	15.0	39.5	19.0	41.5	22.5	42.0	23.0	42.5	24.0	43.0	24.5	43.5	25.0	....	....	....	....	....	....
Wheatland-89	35.5	13.5	39.5	17.5	41.5	19.5	42.0	20.5	42.5	21.0	43.0	21.5	43.5	22.5	....	....	....	....	....	....
Youngstown-6	35.5	15.0	39.5	19.0	41.5	22.5	42.0	23.0	42.5	24.0	43.0	24.5	43.5	25.0	29.0	10.0	33.0	14.0	36.5	17.5

Galvanized discounts based on zinc at 17¢ per lb, East St. Louis. For each 1¢ change in zinc, discounts vary as follows: ½ in., ¾ in., and 1 in., 1 pt.; 1¼ in., 1½ in., 2 in., ¾ pt.; 2½ in., 3 in., ½ pt. Calculate discounts on even cents per lb of zinc, i.e., if zinc is 16.51¢ to 17.50¢ per lb, use 17¢. Jones & Laughlin discounts apply only when zinc price changes 1¢.

Threads only, buttweld and seamless, 1 pt. higher discount. Plain ends, buttweld and seamless, 3 in. and under, 3½ pts. higher discount. Buttweld jobbers' discount, 5 pct.

WAREHOUSES

Base price, f.o.b., dollars per 100 lb. *(Metropolitan area delivery add 20¢ except Birmingham, San Francisco, Cincinnati, New Orleans, St. Paul, add 15¢; Memphis, add 10¢; Philadelphia, add 25¢; New York, add 30¢).

Cities	Sheets			Strip		Plates	Shapes	Bars		Alloy Bars			
	Hot-Rolled	Cold-Rolled (15 gage)	Galvanized (10 gage)	Hot-Rolled	Cold-Rolled		Standard Structural	Hot-Rolled	Cold-Finished	Hot-Rolled A 4615 As rolled	Hot-Rolled A 4140 Annealed	Cold-Drawn A 4615 As rolled	Cold-Drawn A 4140 Annealed
Baltimore	5.60	6.84	7.49[2]–8.07	6.04	.....	5.80	6.14	6.04	6.84–6.89	10.24	10.54	11.89	12.19
Birmingham*	5.60	6.40	6.75	5.55	.....	5.95	5.70	5.55	.....	.....	.....	.....	.....
Boston	6.20	7.00–7.25	7.74–8.29	6.15	8.50[4]	6.48–6.78	6.20	6.05	6.79–6.84	10.25	10.55	11.90–12.00	12.20–12.30
Buffalo	5.60	6.40	7.74–8.09	5.86	.....	6.05	5.80	5.80	6.40–6.45	10.15–10.85	10.45	11.80	11.95–12.10
Chicago	5.60	6.40	7.75	5.55	.....	5.80	5.70	5.55	6.30	9.80	10.10	11.45	11.75
Cincinnati*	5.87	6.44	7.39	5.80	.....	6.19	6.09	5.80	6.61	10.15	10.45	11.80	12.16
Cleveland	5.60	6.40	8.10	5.69	6.90	5.92	5.82	5.57	6.40	9.91	10.21	11.56	11.86
Detroit	5.78	6.53	7.89	5.94	.....	5.99	6.09	5.84	6.58	10.11	10.41	11.76	12.06
Houston	7.00	8.25	.....	.....	.....	6.85	6.50	6.65	9.35	10.35	11.25	.....	12.75
Indianapolis, del'd	6.00	6.80	8.15	5.95	.....	6.20	6.10	5.95	6.80	.....	.....	.....	.....
Kansas City	6.00	6.80	7.45	6.15	7.50	6.40	6.30	6.15	7.00	10.40	10.70	12.05	12.35
Los Angeles	6.35	7.90	8.85	6.40	9.45[4]	6.40	6.35	6.35	8.20	11.30	11.30	13.20	13.50
Memphis*	6.33–6.38	7.08–7.18	.....	6.33–6.38	.....	6.43–8.02	6.33–6.48	6.08–6.33	7.16–7.32	.....	.....	.....	.....
Milwaukee	5.74	6.54	7.89	5.89–6.59	.....	5.94	5.84	5.69	6.44–6.54	9.94	10.24	11.59	11.89
New Orleans*	5.70	6.59	.....	5.75	7.25	5.95	5.75	5.75	7.30	.....	.....	.....	.....
New York*	5.67–5.97	7.19[5]–7.24[1]	8.14[2]	6.29–6.89	8.63[4]	6.28–6.58	6.10	6.12	6.99	10.05–10.15	10.35–10.45	11.70–11.80	12.10–12.20
Norfolk	6.50[3]	.....	.....	.....	.....	6.50[3]	6.60[3]	6.55[3]	.....	.....	.....	.....	.....
Philadelphia*	5.90	6.80	8.00	6.10	.....	6.05	5.90	6.05	6.86	9.90	10.20	.....	.....
Pittsburgh	5.60	6.40	7.75	5.65–5.95	.....	5.75	5.70	5.55	6.15	9.80	10.10	11.45	11.75
Portland	6.60–7.55	8.95	8.50–9.10	7.30	.....	6.80	6.95	6.90	.....	.....	12.15	.....	.....
Salt Lake City	7.95	.....	9.70–10.50[2]	8.70–8.75	.....	8.05	6.75–8.30	7.95–8.65	9.00	.....	.....	.....	.....
San Francisco*	6.65	8.05[2]	8.55–8.90[2]	6.60	9.45[4]	6.50	6.45	6.45	8.20	11.30	11.30	13.20	13.20–13.50
Seattle	7.05	8.60	9.20	9.05	.....	6.75	6.65	6.75	9.05	.....	.....	.....	.....
St. Louis	5.80–5.85	6.65	8.00	5.80	8.00[4]–8.28	6.13	6.03	5.80	6.55–6.65	10.05	10.35	11.70	12.00
St. Paul*	6.16	6.96	8.31	6.11	.....	6.36	6.26	6.11	6.96	10.36	10.66	12.01	12.31

BASE QUANTITIES (Standard unless otherwise keyed): Cold finished bars; 2000 lb or over. Alloy bars; 1000 to 1999 lb. All others; 2000 to 9999 lb. All HR products may be combined for quantity. All galvanized sheets may be combined for quantity. CR sheets may not be combined with each other or with galvanized sheets, for quantity.

EXCEPTIONS: (1) 400 to 1499 lb; (2) 450 to 1499 lb; (3) 400 to 1999 lb; (4) 6000 lb and over; (5) 1500 to 9999 lb; (6) 2000 to 5999 lb.

PIG IRON

Dollars per gross ton, f.o.b., subject to switching charges.

Producing Point	Basic	No. 2 Foundry	Malleable	Bessemer	Low Phos.	Blast Furnace Silvery	Low Phos. Charcoal
Bethlehem-3	54.00	54.50	55.00	55.50	.....	.....	.....
Birmingham-4	48.38	48.88	.....	.....	.....	.....	.....
Birmingham-91	48.38	48.88	.....	.....	.....	.....	.....
Birmingham-92	48.38	48.88	.....	.....	.....	.....	.....
Buffalo-4	52.00	52.50	53.00	.....	.....	.....	.....
Buffalo-93	52.00	52.50	53.00	.....	.....	63.75	.....
Chicago-94	52.00	52.50	52.50	53.00	.....	.....	.....
Cleveland-2	52.00	52.50	52.50	53.00	57.00	.....	.....
Cleveland-4	52.00	52.50	52.50	.....	.....	.....	.....
Daingerfield, Tex.-95	48.00	48.50	48.50	.....	.....	.....	.....
Duluth-94	52.00	52.50	52.50	53.00	.....	.....	.....
Erie-94	52.00	52.50	52.50	53.00	.....	.....	.....
Everett, Mass.-96	.....	51.75	52.25	.....	.....	.....	.....
Fontana-19	58.00	58.50	.....	.....	.....	.....	.....
Geneva, Utah-16	52.00	52.50	52.50	53.00	.....	.....	.....
Granite City, Ill.-102	53.90	54.40	54.90	.....	.....	.....	.....
Hubbard, Ohio-6	52.00	52.50	52.50	.....	.....	.....	.....
Ironton, Utah-16	52.00	52.50	.....	.....	.....	62.50	.....
Jackson, Ohio-97, 98	.....	.....	.....	.....	.....	.....	66.00
Lyle, Tenn.-101	.....	.....	.....	.....	.....	.....	.....
Monessen-18	54.00	.....	.....	.....	.....	.....	.....
Neville Island-99	52.00	52.50	52.50	53.00	.....	.....	.....
Pittsburgh-1	52.00	.....	.....	53.00	.....	.....	.....
Sharpsville-100	52.00	52.50	52.50	53.00	.....	.....	.....
Steelton-3	54.00	54.50	55.00	55.50	60.00	.....	.....
Swedeland-26	56.00	56.50	57.00	57.50	.....	.....	.....
Toledo-94	52.00	52.50	52.50	53.00	.....	.....	.....
Troy, N. Y.-4	54.00	54.50	55.00	.....	60.00	.....	.....
Youngstown-8	52.00	52.50	52.50	53.00	.....	.....	.....

DIFFERENTIALS: Add 50¢ per ton for each 0.25 pct silicon over base (1.75 to 2.25 pct), 50¢ per ton for each 0.50 pct manganese over 1 pct. $2 per ton for 0.5 to 0.75 pct nickel, $1 for each additional 0.25 pct nickel. Subtract 38¢ per ton for phosphorus content over 0.70 pct. Silvery iron: Add $1.50 per ton for each 0.50 pct silicon over base (6.01 to 6.50 pct) up to 10 pct. $1 per ton for 0.75 pct or more phosphorus, manganese as above. Bessemer ferrosilicon prices are $1 over comparable silvery iron.

REFRACTORIES

Fire Clay Brick *(F.o.b. works) Carloads, Per 1000*

First quality, Ill., Ky., Md., Mo., Ohio, Pa. (except Salina, Pa., add $5).....$94.60
No. 1 Ohio..... 88.00
Sec. quality, Pa., Md., Ky., Mo., Ill.. 88.00
No. 2 Ohio..... 79.20
Ground fire clay, net ton, bulk (except Salina, Pa., add $1.50)..... 13.75

Silica Brick

Mt. Union, Pa., Ensley, Ala.....$94.60
Childs, Pa. 99.00
Hays, Pa. 100.10
Chicago District 104.50
Western Utah and Calif.....111.10
Super Duty, Hays, Pa., Athens, Tex., Chicago 111.10
Silica cement, net ton, bulk, Eastern (except Hays, Pa.)..... 16.50
Silica cement, net ton, bulk, Hays, Pa. 18.70
Silica cement, net ton, bulk, Ensley, Ala. 17.60
Silica cement, net ton, bulk, Chicago District 17.60
Silica cement, net ton, bulk, Utah and Calif. 24.70

Chrome Brick *Per Net Ton*

Standard chemically bonded, Balt., Chester $82.00

Magnesite Brick

Standard, Baltimore $104.00
Chemically bonded, Baltimore.... 93.00

Grain Magnesite *St. ⅜-in. grains*

Domestic, f.o.b. Baltimore, in bulk fines removed.....$62.70
Domestic, f.o.b. Chewelah, Wash., in bulk 36.30
in sacks 41.80

Dead Burned Dolomite

F.o.b. producing points in Pennsylvania, West Virginia and Ohio, per net ton, bulk Midwest, add 10¢; Missouri Valley, add 20¢....$13.00

COKE

Furnace, beehive (f.o.b. oven) Net Ton
Connellsville, Pa. .....$14.50 to $15.00
Foundry, beehive (f.o.b. oven)
Connellsville, Pa. .....$17.50 to $18.00
Foundry, oven coke
Buffalo, del'd $26.69
Chicago, f.o.b. 23.00
Detroit, f.o.b. 24.00
New England, del'd..... 24.80
Seaboard, N. J., f.o.b. 22.75
Philadelphia, f.o.b. 22.70
Swedeland, Pa., f.o.b. 22.60
Painesville, Ohio, f.o.b..... 24.00
Erie, Pa., f.o.b..... 23.50
Cleveland, del'd 25.72
Cincinnati, del'd 25.06
St. Paul, f.o.b..... 22.50
St. Louis 25.40
Birmingham, del'd 21.69
Neville Island 23.00

LAKE SUPERIOR ORES

(51.50% Fe; natural content, delivered lower lake ports) *Per gross ton*

Old range, bessemer..... $8.70
Old range, nonbessemer..... 8.55
Mesabi, bessemer 8.45
Mesabi, nonbessemer 8.30
High phosphorus 8.30

After adjustments for analyses, prices will be increased or decreased as the case may be for increases or decreases after Dec. 2, 1950, in lake vessel rates, upper lake rail freights, dock handling charges and taxes thereon.

C-R SPRING STEEL

F.o.b. Mill Cents Per Lb.	CARBON CONTENT				
	0.26–0.40	0.41–0.60	0.61–0.80	0.81–1.05	1.06–1.35
Bridgeport, Conn.-58	5.35	6.80	7.40	9.35	11.65
Carnegie, Pa.-41	.....	6.80	7.40	9.35	11.65
Cleveland-2	4.65	6.45	7.40	9.35	11.65
Detroit-68	5.60	6.65	7.25	.....	.....
New Castle, Pa.-40	5.35	6.80	7.40	9.35	.....
New Haven, Conn.-68	5.85	6.75	7.35	.....	.....
Sharon, Pa.-13	5.35	6.80	7.40	9.35	11.65
Weirton, W. Va.-9	5.35	6.80	7.40	9.35	11.65
Worcester, Mass.-2	4.95	6.75	7.70	9.65	11.65
Youngstown-48	.....	6.80	7.40	9.35	11.65

BOLTS, NUTS, RIVETS, SCREWS

Consumer Prices

(Base discount, f.o.b. mill, Pittsburgh, Cleveland, Birmingham or Chicago)

Machine and Carriage Bolts

	Pct Off List Less Case	C.
½ in. & smaller x 6 in. & shorter	15	28½
9/16 in. & ⅝ in. x 6 in. & shorter	18½	30½
¾ in. & larger x 6 in. & shorter	17½	29½
All diam. longer than 6 in.	14	27½
Lag, all diam. x 6 in. & shorter	23	35
Lag, all diam. longer than 6 in.	21	33
Plow bolts	34	....

Nuts, Hot Pressed, Cold Punched—Sq

	Pct Off List Less Keg (Reg.)	K.	Less Keg (Hvy.)	K.
½ in. & smaller	15	28½	15	28½
9/16 in. & ⅝ in.	12	25	6½	21
¾ in. to 1½ in. inclusive	9	23	1	16½
1⅝ in. & larger	7½	22	1	16½

Nuts, Hot Pressed—Hexagon

½ in. & smaller	26	37	22	34
9/16 in. & ⅝ in.	16½	29½	6½	21
¾ in. to 1½ in. inclusive	12	25	2	17½
1⅝ in. & larger	8½	23	2	17½

Nuts, Cold Punched—Hexagon

½ in. & smaller	26	37	22	34
9/16 in. & ⅝ in.	23	35	17½	30½
¾ in. to 1½ in. inclusive	19½	31½	12	25
1⅝ in. & larger	12	25	6½	21

Nuts, Semi-Finished—Hexagon

	Reg.		Hvy.	
½ in. & smaller	35	45	28½	39½
9/16 in. & ⅝ in.	29½	40½	22	34
¾ in. to 1½ in. inclusive	24	36	15	28½
1⅝ in. & larger	13	26	8½	23
	Light			
7/16 in. & smaller	35	45		
½ in. thru ⅝ in.	28½	39½		
¾ in. to 1½ in. inclusive	26	37		

Stove Bolts — *Pct Off List*

Packaged, steel, plain finished	56—10
Packaged, plated finish	41—10
Bulk, plain finish**	67*

*Discounts apply to bulk shipments in not less than 15,000 pieces of a size and kind where length is 3-in. and shorter; 5000 pieces for lengths longer than 3-in. For lesser quantities, packaged price applies.

**Zinc, Parkerized, cadmium or nickel plated finishes add 6¢ per lb net. For black oil finish, add 2¢ per lb net.

Rivets

½ in. & larger	Base per 100 lb. $7.85
7/16 in. & smaller	Pct Off List 36

F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham, Lebanon, Pa.

Cap and Set Screws

(In bulk)	Pct Off List
Hexagon head cap screws, coarse or fine thread, ¼ in. thru ⅝ in. x 6 in., SAE 1020, bright	54
¾ in. thru 1 in. up to & including 6 in.	48
¼ in. thru ⅝ in. x 6 in. & shorter high C double heat treat	46
¾ in. thru 1 in. up to & including 6 in.	41
Milled studs	35
Flat head cap screws, listed sizes	16
Fillister head cap, listed sizes	34
Set screws, sq head, cup point, 1 in. diam and smaller x 6 in. & shorter	53

S. M. Ferrochrome

Contract price, cents per pound, chromium contained, lump size, delivered.

High carbon type: 60-65% Cr, 4-6% Si, 4-6% Mn, 4-6% C.

Carloads	21.60
Ton lots	23.75
Less ton lots	25.25

Low carbon type: 62-66% Cr, 4-6% Si, 4-6% Mn, 1.25% max. C.

Carloads	27.75
Ton lots	30.05
Less ton lots	31.85

ELECTRODES

Cents per lb., f.o.b. plant threaded electrodes with nipples, unboxed

Diam. in in.	Length in in.	Cents Per lb.
	GRAPHITE	
17, 18, 20	60, 72	17.85
8 to 16	48, 60, 72	17.85
7	48, 60	19.57
6	48, 60	20.95
4, 5	40	21.50
3	40	22.61
2½	24, 30	23.15
2	24, 30	25.36
	CARBON	
40	100, 110	8.03
35	65, 110	8.03
30	65, 84, 110	8.03
24	72 to 104	8.03
20	84, 90	8.03
17	60, 72	8.03
14	60, 72	8.57
10, 12	60	8.84
8	60	9.10

CLAD STEEL

Base prices, cents per pound, f.o.b. mill

Stainless-carbon	Plate	Sheet
No. 304, 20 pct.		
Coatesville, Pa. (21)	*29.5	
Washgtn, Pa. (39)	*29.5	
Claymont, Del. (29)	*28.00	
Conshohocken, Pa. (26)		*24.00
New Castle, Ind. (55)	*26.50	*25.50
Nickel-carbon		
10 pct Coatesville (21)	32.5	
Inconel-carbon		
10 pct Coatesville (21)	40.5	
Monel-carbon		
10 pct Coatesville (21)	33.5	
No. 302 Stainless-copper stainless, Carnegie, Pa. (60)		77.00
Aluminized steel sheets, hot dip, Butler, Pa. (7)		7.75

*Includes annealing and pickling, or sandblasting.

TOOL STEEL

F.o.b. mill

W	Cr	V	Mo	Co	Base per lb
18	4	1	—	—	$1.235
18	4	1	—	5	$1.36
18	4	2	—	—	$1.38
1.5	4	1.5	8	—	78.5¢
6	4	2	6	—	87¢

High-carbon chromium	63.5¢
Oil hardened manganese	35¢
Special carbon	32.5¢
Extra carbon	27¢
Regular carbon	23¢

Warehouse prices on and east of Mississippi are 3¢ per lb higher. West of Mississippi, 5¢ higher.

METAL POWDERS

Per pound, f.o.b. shipping point, in ton lots, for minus 100 mesh.

Swedish sponge iron c.i.f. New York, ocean bags	7.4¢ to 9.0¢
Canadian sponge iron, del'd, In East	10.00¢
Domestic sponge iron, 98+% Fe, carload lots	9.0¢ to 15.0¢
Electrolytic iron, annealed, 99.5+% Fe	36.0¢ to 39.5¢
Electrolytic iron, unannealed, minus 325 mesh, 99+% Fe	48.5¢
Hydrogen reduced iron, minus 300 mesh, 98+% Fe	63.0¢ to 80.0¢
Carbonyl iron, size 5 to 10 micron, 98%, 99.8+% Fe	83.0¢ to $1.48
Aluminum	29.00¢
Brass, 10 ton lots	30.00¢ to 33.25¢
Copper, electrolytic	10.75¢ plus metal value
Copper, reduced	10.00¢ plus metal value
Cadmium, 100-199 lb.	95¢ plus metal value
Chromium, electrolytic, 99% min., and quantity	$3.50
Lead	7.5¢ to 12.0¢ plus metal value
Manganese	52.00¢
Molybdenum, 99%	$2.65
Nickel, unannealed	88.0¢
Nickel, annealed	95.0¢
Nickel, spherical, unannealed	92.0¢
Silicon	38.5¢
Solder powder	6.5¢ to 8.5¢ plus met. value
Stainless steel, 302	83.00¢
Stainless steel, 316	$1.10
Tin	14.00¢ plus metal value
Tungsten, 99%	$4.15
Zinc, 10 ton lots	23.0¢ to 30.5¢

ELECTRICAL SHEETS

22 Ga. H-R cut lengths

F.o.b. Mill Cents Per Lb.	Armature	Elec.	Motor	Dynamo	Transf. 72	Transf. 65	Transf. 58
Beech-Bottom-15	....	7.25	8.50	9.30	9.85	0.40	11.10
Brackenridge-28	....	7.25	8.50	9.30	9.85	....	....
Follansbee-63	8.75	7.25	8.50	9.30	9.85	0.40	11.10
Granite City-22	....	7.95	9.20	....	....	....	....
Ind. Harbor-3	6.75	7.25	....	....	....	....	....
Mansfield-75	7.25	7.75	9.00	9.80	....	....	....
Niles, O.-84	7.05	7.55	....	....	....	....	....
Vandergrift-	8.75	7.25	8.50	9.30	9.85	0.40	11.10
Warren, O.-4	8.75	7.25	8.50	9.30	9.85	0.40	11.10
Zanesville-7	8.75	7.25	8.50	9.30	9.85	0.40	11.10

Ferrochrome

Contract prices, cents per pound, contained Cr, lump size, bulk, in carloads, delivered. (65-72% Cr, 2% max. Si.)

0.06% C	30.50	0.20% C	29.50
0.10% C	30.00	0.50% C	29.25
0.15% C	29.75	1.00% C	29.00
2.00% C			28.75
65-69% Cr, 4-9% C			22.00
62-66% Cr, 4-6% C, 6-9% Si.			22.85

High-Nitrogen Ferrochrome

Low-carbon type: 67-72% Cr, 0.75% N. Add 5¢ per lb to regular low carbon ferrochrome price schedule. Add 5¢ for each additional 0.25% N.

Chromium Metal

Contract prices, per lb chromium contained, packed, delivered, ton lots. 97% min. Cr, 1% max. Fe.

0.20% max. C	$1.09
0.50% max. C	1.05
.00 min. C	1.04

Low Carbon Ferrochrome Silicon

(Cr 34-41%, Si 42-49%, C 0.05% max.) Contract price, carloads, f.o.b. Niagara Falls, freight allowed; lump 4-in. x down, bulk 2-in. x down, 21.75¢ per lb of contained Cr plus 12.00¢ per lb of contained Si.

Bulk 1-in. x down, 21.90¢ per lb contained Cr plus 12.20¢ per lb contained Si.

Calcium-Silicon

Contract price per lb of alloy, dump, delivered.

30-33% Ca, 60-65% Si, 3.00% max. Fe

Carloads	19.00
Ton lots	22.10
Less ton lots	23.60

Calcium-Manganese—Silicon

Contract prices, cents per lb of alloy, lump, delivered.

16-20% Ca, 14-18% Mn, 53-59% Si.

Carloads	20.00
Ton lots	22.30
Less ton lots	23.20

CMSZ

Contract price, cents per lb of alloy, delivered.

Alloy 4: 45-49% Cr, 4-6% Mn, 18-21% Si, 1.25-1.75% Zr, 3.00-4.5% C.

Alloy 5: 50.56% Cr, 4-6% Mn, 13.50-16.00% Si, 0.75 to 1.25% Zr, 3.50-5.00% C.

Ton lots	20.75
Less ton lots	22.10

V Foundry Alloy

Cents per pound of alloy, f.o.b. Suspension Bridge, N. Y., freight allowed, max. St. Louis. V-5: 38-42% Cr, 17-19% Si, 8-11% Mn.

Ton lots	16.50
Less ton lots	17.75

Graphidox No. 4

Cents per pound of alloy, f.o.b. Suspension Bridge, N. Y., freight allowed, max. St. Louis. Si 48 to 52%, Ti 9 to 11%, Ca 5 to 7%.

Carload packed	18.00
Ton lots to carload packed	19.00
Less ton lots	20.50

SMZ

Contract price, cents per pound of alloy, delivered, 60-65% Si, 5-7% Mn, 5-7% Zr, 20% Fe, ½ in. x 12 mesh.

Ton lots	17.75
Less ton lots	18.75

FERROALLOYS

Ferromanganese

78-82% Mn. maximum contract base price, gross ton, lump size.

F.o.b. Niagara Falls, Alloy, W. Va., Welland, Ont., Ashtabula, O.	$185
F.o.b. Johnstown, Pa.	$187
F.o.b. Sheridan, Pa.	$185
F.o.b. Etna, Clairton, Pa.	$188

$2.00 for each 1% above 82% Mn, penalty, $2.15 for each 1% below 78%.

Briquets—Cents per pound of briquet, delivered, 66% contained Mn.

Carload, bulk	10.95
Ton lots	12.55

Spiegeleisen

Contract prices gross ton, lump, f.o.b.

	16-19% Mn 3% max. Si	19-21% Mn 3% max. Si
Palmerton, Pa.	$74.00	$75.00
Pgh. or Chicago	74.00	75.00

Manganese Metal

Contract basis, 2 in. x down, cents per pound of metal, delivered.

96% min. Mn, 0.2% max. C, 1% max. Si, 2% max. Fe.

Carload, packed	29.75
Ton lots	31.25

Electrolytic Manganese

F.o.b. Knoxville, Tenn., freight allowed east of Mississippi, cents per pound.

Carloads	28
Ton lots	30
Less ton lots	32

Medium Carbon Ferromanganese

Mn 80% to 85%, C 1.25 to 1.50. Contract price, carloads, lump, bulk, delivered, per lb. of contained Mn ..... 19.15¢

Calcium Metal

Eastern zone contract prices, cents per pound of metal, delivered.

	Cast	Turnings	Distilled
Ton lots	$2.05	$2.95	$3.75
Less ton lots	2.40	3.30	4.55

Silicomanganese

Contract basis, lump size, cents per pound of metal, delivered, 65-68% Mn, 18-20% Si, 1.5% max. C. For 2% max. C, deduct 0.2¢.

Carload bulk	9.90
Ton lots	11.55
Briquet, contract basis carlots, bulk delivered, per lb of briquet	11.15
Ton lots	11.75

Silvery Iron (electric furnace)

Si 14.01 to 14.50 pct, f.o.b. Keokuk, Iowa, or Wenatchee, Wash., $92.50 gross ton, freight allowed to normal trade area. Si 15.01 to 15.50 pct, f.o.b. Niagara Falls, N. Y., $83.00. Add $1.00 per ton for each additional 0.50% Si up to and including 18%. Add $1.00 for each 0.50% Mn over 1%.

Silicon Metal

Contract price, cents per pound contained Si, lump size, delivered, for ton lots packed.

96% Si, 2% Fe	21.70
97% Si, 1% Fe	22.10

Silicon Briquets

Contract price, cents per pound of briquet bulk, delivered, 40% Si, 1 lb Si briquets.

Carload, bulk	6.95
Ton lots	8.55

Electric Ferrosilicon

Contract price, cents per pound contained Si, lump, bulk, carloads, delivered.

25% Si	19.00	75% Si	14.30
50% Si	12.40	85% Si	15.55
90-95% Si			17.50

Low-Carbon Ferromanganese

Contract price, cents per pound Mn contained, lump size, del'd, Mn 85-90%.

	Carloads	Ton	Less
0.7% max. C, 0.06% P, 90% Mn	26.25	28.10	29.30
0.07% max. C	25.75	27.60	28.80
0.15% max. C	25.25	27.10	28.30
0.30% max. C	24.75	26.60	27.80
0.50% max. C	24.25	26.10	27.30
0.75% max. C, 7.00% max. Si	21.25	23.10	24.30

Other Ferroalloys

Alsifer, 20%, Al, 40% Si, 40% Fe, contract basis, f.o.b. Suspension Bridge, N. Y.	
Carload	9.90¢
Ton lots	11.30¢
Calcium molybdate, 45-40%, f.o.b. Langeloth, Pa., per pound contained Mo.	$1.15
Ferrocolumbium, 50-60%, 2 in x D, contract basis, delivered, per pound contained Cb.	
Ton lots	$4.90
Less ton lots	4.95
Ferro - Tantalum - columbium, 20% Ta, 40% Cb, 0.30 C. Contract basis, delivered, ton lots, 2 in. x D, per lb of contained Cb plus Ta	$3.75
Ferromolybdenum, 55-75%, f.o.b. Langeloth, Pa., per pound contained Mo.	$1.32
Ferrophosphorus, electrolytic, 23-26%, car lots, f.o.b. Siglo, Mt. Pleasant, Tenn., $3 unitage, per gross ton	$65.00
10 tons to less carload	75.00
Ferrotitanium, 40%, regular grade, 0.10% C max., f.o.b. Niagara Falls, N. Y., and Bridgeville, Pa., freight allowed, ton lots, per lb contained Ti	$1.35
Ferrotitanium, 25%, low carbon, 0.10% C max., f.o.b. Niagara Falls, N. Y., and Bridgeville, Pa., freight allowed, ton lots, per lb contained Ti	$1.50
Less ton lots	$1.55
Ferrotitanium, 15 to 19%, high carbon, f.o.b. Niagara Falls, N. Y., freight allowed, carload per net ton	$177.00
Ferrotungsten, standard, lump or ¼ x down, packed, per pound contained W, 5 ton lots, delivered	$3.25
Ferrovanadium, 35-55%, contract basis, delivered, per pound, contained V.	
Openhearth	$3.00-$3.05
Crucible	3.10- 3.15
High speed steel (Primos)	3.35
Molybdic oxide, briquets or cans, per lb contained Mo, f.o.b. Langeloth, Pa.	$1.14
bags, f.o.b. Washington, Pa., Langeloth, Pa.	$1.13
Simanal, 20% Si, 20% Mn, 20% Al, contract basis, f.o.b. Philo, Ohio, freight allowed, per pound	
Carload, bulk lump	14.50¢
Ton lots, bulk lump	15.75¢
Less ton lots, lump	16.25¢
Vanadium pentoxide, 88-92% V_2O_5 contract basis, per pound contained V_2O_5	$1.30
Zirconium, 35-40%, contract basis, f.o.b. plant, freight allowed, per pound of alloy.	
Ton lots	21.00¢
Zirconium, 12-15%, contract basis, lump, delivered, per lb of alloy.	
Carload, bulk	7.00¢

Boron Agents

Contract prices per lb of alloy,	del.
Borosil, f.o.b. Philo, Ohio, freight allowed, B, 3-4%, Si, 40-45%, per lb contained B	$5.35
Bortam, f.o.b. Niagara Falls	
Ton lots, per pound	45¢
Less ton lots, per pound	50¢
Carbortam, Ti, 15-21%, B, 1-2%, Si, 2-4%, Al, 1-2%, C, 4.5-7.5%, f.o.b. Suspension Bridge, N. Y., freight allowed.	
Ton lots, per pound	10.00¢
Ferroboron, 17.50% min. B, 1.50% max. Si, 0.50% max. Al, 0.50% max. C, 1 in. x D. Ton lots	$1.20
F.o.b. Wash., Pa.; 100 lb up	
10 to 14% B	.75
14 to 19% B	1.25
19% min. B	1.50
Grainal, f.o.b. Bridgeville, Pa., freight allowed, 100 lb and over.	
No. 1	$1.00
No. 6	60¢
No. 79	50¢
Manganese—Boron 75.00% Mn, 15-20% B, 5% max. Fe, 1.50% max. Si, 3.00% max. C, 2 in. x D, del'd.	
Ton lots	$1.45
Less ton lots	1.57
Nickel—Boron 15-18% B, 1.00% max. Al, 1.50% max. Si, 0.50% max. C, 3.00% max. Fe, balance Ni, delivered.	
Less ton lots	$1.80
Silcaz, contract basis, delivered.	
Ton lots	45.00¢